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**The  
Commercial Problem  
in Buildings**

*By Cecil C. Evers*

**The Record and Guide Company  
New York**

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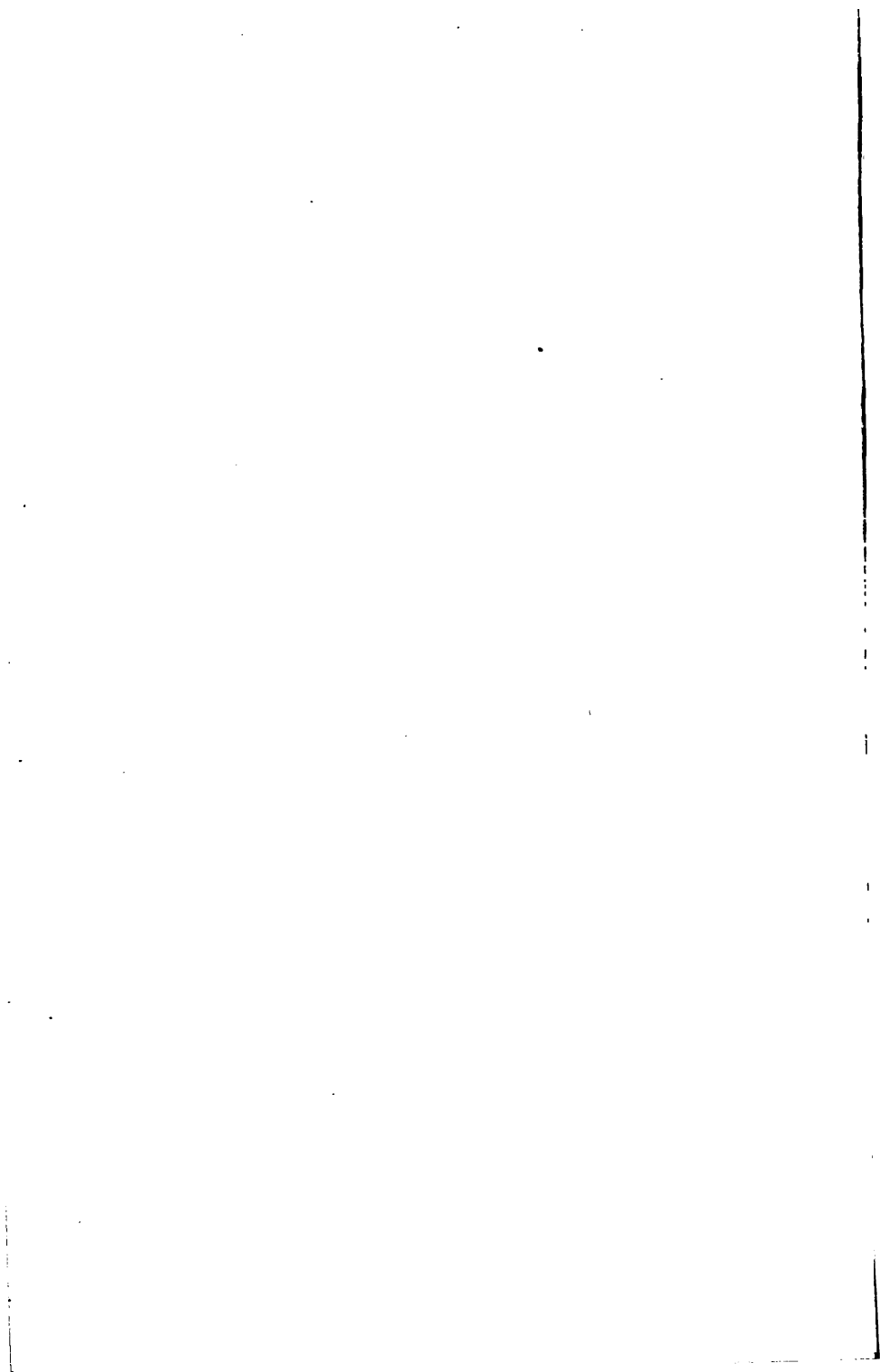
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**A GOOD FRONT FOR A COMMERCIAL BUILDING.**

Plenty of light, a simple and direct elevation, good access, and good light to ground floor stores. Union Square, New York, N. Y.

THE  
COMMERCIAL PROBLEM  
IN BUILDINGS

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A Discussion of the Economic and Structural  
Essentials of Profitable Building, and  
the Basis for Valuation of  
Improved Real Estate

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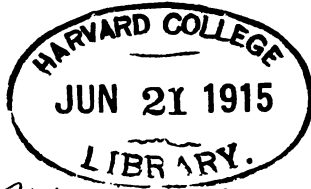
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# THE COMMERCIAL PROBLEM IN BUILDINGS

## PREFACE.

**W**RITERS on architecture and building seldom pay any attention to the commercial element in buildings and deal only incidentally with utilitarian requirements.

Buildings, however, are essentially utilities and their commercial success, as well as the satisfactory accomplishment of the purposes for which they are erected, is obtained by using other standards than the purely architectural or structural ones by which they are generally measured.

We often meet with unsuccessful buildings—buildings which are misplaced, unsuited to their surroundings, too costly, poorly planned, or which in other ways cause loss of income, and hence capital, to their owners and discomfort to their tenants. These mistakes can frequently be avoided by giving careful consideration to certain principles which are taught us by observation and experience.

It is intended to state what these principles are and to call attention to and endeavor to classify the different elements which are beneficial or detrimental to buildings from the utilitarian or financial standpoint; and to show the relation which exists between a building and the land it stands on, the earning power of which can be impaired or destroyed if the building is unsuitable.

The nature of this problem and the different ways in which it presents itself will be considered, and buildings will be viewed from the standpoint of the investor.

The difference which frequently exists between commercial value and structural value will be pointed out, also the difference between commercial life and structural life.

In order to understand how buildings are affected by such factors as accessibility, transportation, topography, etc., it will be necessary to consider them in connection with the city or town of which they are component parts, and to study the influence exerted on them by their surroundings.

The results of municipal or legislative action and restrictions will also be inquired into.

The structure proper will be considered and its different parts studied with a view to ascertaining their relative importance in different classes of buildings; planning being generally a series of compromises, it should be understood which are the most important requirements and which should be sacrificed if all cannot be obtained.

The bearing which all these considerations have on commercial value will be explained and the method of ascertaining the value of improved real estate will be pointed out, showing that the ultimate test of the value of a building is its earning capacity and not its cost.

It is hoped that the following chapters dealing with these subjects may be useful in drawing the attention of investors, architects and others interested in real estate to the utilitarian and commercial requirements of buildings as distinguished from their architectural and structural needs.

The writer wishes here to express his thanks to all those who have assisted him in the preparation of this book, and especially to Mr. Richard M. Hurd, to whose friendship and counsel for the past eighteen years, any merit it may have is largely due.

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## CHAPTER I.

### INTRODUCTORY

Rapid growth and increasing importance of cities—Complexity of buildings increases with complexity of society—Supplying the demand for new buildings—Slow response to demand for new buildings frequently results in overproduction—Buildings considered as “necessities” and “luxuries”—Speculative building in large cities—The conception of a proposed building—The commercial problem in building—Example of the commercial problem.

ONE of the most conspicuous features of the Nineteenth Century was the rapid growth of cities in population, wealth and power.

This growth, which continues unabated in the older as well as the younger communities, is due mainly to the great changes which have taken place in industrial conditions; to the increasing importance of manufacturing industries and commerce, which have their centers of activity in cities and which attract great numbers of men in search of employment.

The tendency of all wealth to gravitate to large cities, the attraction these exert on the leaders of all departments of work and thought and the greater facilities for education, as well as for amusement and social intercourse, are all factors drawing additional population to the big urban centres and increasing their power and importance.

Also, the growth of cities has been facilitated and accentuated by the improvements which have taken place in urban transportation, extending the area over which they can expand, which in former days was limited by the

## THE COMMERCIAL PROBLEM IN BUILDINGS

difficulties of intercommunication as well as by other causes.

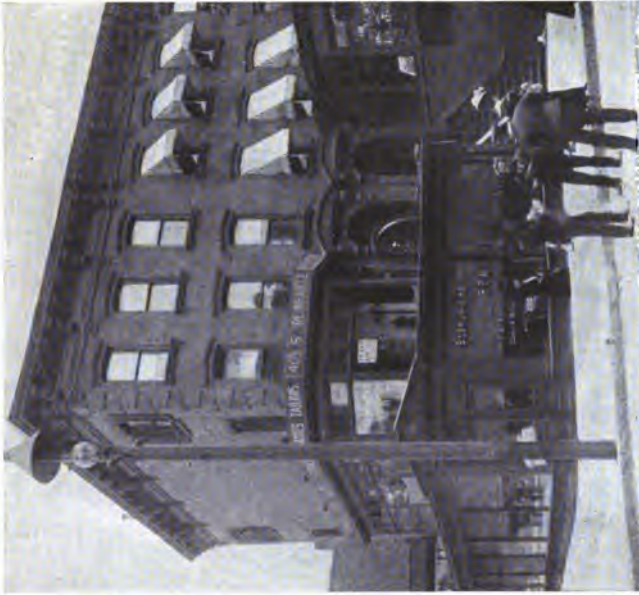
The rapid increase in population of cities and the requirements of a civilization which is constantly becoming more complex, creates a demand for new buildings of various types and for many different uses; at the same time it necessitates the reconstruction or replacement of many of those already in existence, with the result that there is an ever-increasing demand for the investment of capital in city buildings.

### COMPLEXITY OF BUILDINGS INCREASE WITH COMPLEXITY OF SOCIETY.

In the smaller towns or villages, one or two general stores will meet the needs of the entire population; doctors, lawyers and other professional men will either have their offices in their residences, or will find accommodation in a few centrally situated buildings. In cities, especially in the larger ones, there will be separate shops for each class of goods, as well as so-called "department stores," dealing in articles of every description; there will also be special buildings containing doctors' offices, others occupied by lawyers, others again by engineers or architects; for there exists a noticeable tendency for the different trades, and in some cases, for the professions, to concentrate in sections and in special buildings with others of similar occupations.

The composition of society is far more complex than it used to be; there are many grades, from the laborer whose only capital is the work of his hands, through the different trades, professions, and various occupations, each tending to become more definite and distinct. The manufactured article which was formerly produced by one worker now passes through many hands, all of which contribute their share to its completion.

This increasing complexity of society is reflected in



(1)—OLD-FASHIONED RESIDENCE REMODELLED FOR USE AS A STORE.—In this case a flower store. Fifth Ave. and 46th St., New York, N. Y.

(2)—REMODELLED DWELLING IN SECTION OF CHANGING CHARACTER.—Rents now between three and four times those of the original dwelling. Street is not sufficiently strong, however, to support stores above ground floor. Sumner Ave., Brooklyn, N. Y.



the many and various buildings composing modern cities. Warehouses are erected for the storage, some of heavy goods, some of lighter articles, some for the preservation of foods, such as cold storage buildings, others where storage is combined with manufacturing. Residences are of different kinds; for occupancy by one family, for the use of two or three or for the housing of twenty or more families; some supplying the simplest accommodation, others again combining the conveniences and luxuries of hotels and the privacy of home life. Residential studios, duplex apartments, housekeeping apartments and various other classes of residential buildings are all manifestations of modern social conditions.

Similar subdivisions might be made in connection with almost any class of buildings, distinguishing those employed for more or less special uses.

The increase in the number and variety of buildings for special uses is accompanied by a greatly increased complexity in the buildings themselves, in the material employed in their construction, in their mechanical appliances of all sorts, most of which are due to modern inventions.

The majority of the buildings in any city are investment buildings and it is hardly necessary to point out that it is advantageous to the community at large that these investments shall yield an adequate return in order that a sufficient supply suitable to the needs of the public may be provided as the demand arises.

#### SUPPLYING THE DEMAND FOR NEW BUILDINGS.

In order that building investments may be profitable and that the supply of new buildings shall be adequate and shall fulfill all requirements, two conditions should be satisfactorily met; first, the general supply should be such as is demanded, providing sufficient accommodation of a suitable class and character in proper locations.

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(1)—A RESIDENTIAL STREET CHANGING TO BUSINESS.—In residential neighborhoods of changing character the advent of stores accentuates the lack of suitability of the old residences and hastens their removal or remodeling. 39th St., New York, N. Y.

(2)—BUILDINGS WHICH HAVE OUTLIVED THEIR COMMERCIAL USEFULNESS CAN SOMETIMES BE REMODELLED TO ADVANTAGE.—The building A is remodelled from a building similar to B, and has a yearly rental of about \$2,000, as compared with the \$35 to \$40 monthly rental of the original building. The terrace on which the old buildings stand has permitted an entrance in the reconstructed building above the level of the sidewalk. South Oxford St., Brooklyn, N. Y.

Secondly, the individual buildings should be so designed as to be as profitable to their owners and as useful to their occupants as possible.

SLOW RESPONSE TO DEMAND FOR NEW BUILDINGS FREQUENTLY RESULTS IN OVERPRODUCTION.

Buildings can be increased in number or the accommodation they supply added to by building higher, but in either case they do not respond quickly to an increased demand, the average building taking from three to six months to erect.

There is seldom any concerted action on the part of those engaged in building operations, each of whom follows his individual judgment, with the result that the building of cities generally proceeds in cycles; when the demand for accommodation is larger than the supply an increase in rents takes place, which by rendering buildings very profitable as investments, brings about a period of great building activity ending frequently in an oversupply. This is followed by a period of relative inactivity and lower rents which continues until the increased demand is sufficient to fill the vacant buildings, when rents are raised and the same process is repeated.

A signal example of an oversupply of buildings in recent years has been that of Chicago, which at the time of the World's Fair provided accommodation for several hundred thousand visitors, resulting, when the exhibition was ended, in hundreds of apartment buildings becoming vacant and unproductive.

Especially at a time when the supply of buildings exceeds the demand, those which are poorly located or where the class or character of requirements has been misjudged, suffer most from lack of tenants and low rentals.

As to the individual buildings, in order that these may be as useful and as profitable as possible, that there

may be an adequate return on the capital invested and that they may best meet the needs of their occupants, it is necessary to apply other standards than the purely architectural ones by which the excellence of buildings is generally measured; and especially is this the case in those two great classes which much exceed all others in number, utility and aggregate importance, viz.: residences and business buildings.

BUILDINGS CONSIDERED AS "NECESSITIES" AND  
"LUXURIES."

Residence and business buildings may be classed as "necessities," as opposed to those others which are "luxuries," in that the latter can more readily be dispensed with than buildings required for residential or business purposes.

Residential and business buildings suited to their locations, find a readier market and are better investment properties than special buildings such as theatres, clubs, stables, garages, and others which can be classed as luxuries.

SPECULATIVE BUILDING IN LARGE CITIES.

Large and growing cities furnish a good field for what is called speculative building, which is the erection by builders and real estate operators of buildings in anticipation of a constant new demand. Apartment houses, flats, tenements, residences of average size and cost and small store buildings are those most generally built in the expectation of finding a market for them on completion.

Men will often purchase ready-made buildings which they can see and inspect and the price of which is known to them, when they will not undertake to build for themselves, incurring an expense which is not well determined, for a result which they are frequently unable to estimate beforehand.

Those builders who correctly interpret the demand are

well rewarded; others, whose buildings do not meet the demand of the purchasing public and more especially those who build too expensively for the neighborhood or in locations in poor demand are almost invariably losers.

Speculative builders erect buildings where they believe there is a demand; and in extreme cases, when construction is carried out on a very large scale, they direct the demand to their location.

Building in sections of established character where the demand is known is less subject to loss than building in outlying sections, especially those removed from proper transportation facilities. Rows of deserted buildings in the midst of fields are frequently found where a city has been overbuilt or the rapidity of its growth diminished; these may eventually come into use if erected in the line of growth, but if the city expands in other directions they may become a total loss.

It is interesting to note how rapidly the adoption by one builder of any new improvement or form of construction or decoration which seems to appeal to the public taste and to add to the selling value of his product, is copied by his competitors; and how, on the introduction of any new type, if successful, numerous similar buildings are erected.

#### IMPORTANCE OF STUDY OF IMPROVEMENTS TO TENEMENTS AND THE CHEAPER CLASS OF RESIDENCES.

The natural desire of the working classes to be as near as possible to their work, has resulted, in most cities of large size, in so-called congested districts, where the unhealthy conditions brought about by crowding large numbers of men, women and children in quarters lacking light, air and privacy, have necessitated municipal regulations, prescribing the height of the buildings, the proportion of land which can be built on, the minimum allowance of cubical contents per person and which enforce

sanitary accommodation and a proper provision of light and air to all rooms.

The problem of the housing of the working classes is one which has received a great deal of attention in most civilized countries in the last twenty or thirty years and many of the worst abuses have been removed and their recurrence prevented.

That the tenement house existed in olden times as well as now is shown by the statements in the *Deutsche Bauzeitung* that in the time of the Early Empire, Rome contained 46,000 tenement houses and only 1,794 private residences, the latter of which were of the most sumptuous description.

In the larger cities there is a distinct preponderance of the poorer class residences, flats and tenements over all other buildings. In New York City the ratio of cost of tenements, apartments and dwellings to all other buildings was in 1905, 72% and in 1910, 60% (these figures being taken from the building permits issued). The proportion would be increased if allowance were made for the many shops and stores of which a large number are occupied for residential purposes above the ground floor.

In the census of 1890 it is stated that in New York City, 6% of the population own their houses, and in the census of 1900, 5.9%; in cities of more than 100,000 the average is given as 23% in 1890 and 28% in 1900.

The great majority of residential buildings not owned by their occupants as well as those containing offices and stores are investment properties, in which utility and profit are the main essentials and, on account of their aggregate importance and the great number of people who are benefited by improvements adding to their comfort and well-being, or increasing their value as investments, they are well worthy of careful study.

## THE "CONCEPTION" OF A PROPOSED BUILDING.

Preceding the work of the architect is the "idea" or "concept," which in its amplified and detailed form is represented by the drawings, specifications and explanations from which a building is erected.

The main object of most building operations being the satisfaction of material needs, the mental concept covers the general requirements, utilitarian and others, of the proposed buildings and furnishes a general mental sketch from which the drawings are prepared.

The general concept of many buildings is simple; a man needs a home, so many rooms of certain sizes, bearing a certain relation to each other, and the whole to cost not more than a given sum; the elaboration of this idea is left to the architect within certain stipulated bounds, suggestions being furnished as to the special needs and requirements of the owner.

Or again, a new church is needed, the seating capacity, cost and certain requirements as to style, material, etc., are furnished, and to the architect is left the solution of the problem within these limits.

## THE COMMERCIAL PROBLEM IN BUILDING.

There are, however, many cases where the original concept has to be carefully matured before the necessary instructions can be supplied for the preparation of drawings.

Let us imagine, for instance, a plot of vacant land situated on an active street in a growing city. No income is being derived from this land, but the expenditure for taxes increases every year as the land becomes more valuable. It is therefore desirable to erect a building which will not only pay interest on the cost of construction but a proper return on the land itself.

Before the plans can be prepared it is necessary to

decide what kind of building will prove the best investment, not only for the present, but for years to come; for the land, once built on, loses its earning capacity if the building is unproductive.

Shall the building cover the entire plot or only a portion of it; how many stories shall be provided; what class of structure shall be erected, and for what uses; shall elevators be supplied or stairs only; and what amount shall be spent on decoration?

The proper solution of the commercial problem thus presented will need an intimate knowledge of the demand for accommodation in the neighborhood in question, the probable permanence of the demand; the possible competition of future buildings, the comparative cost of different classes of buildings and the rents obtainable from them, together with many other minor details not at first apparent.

The problem may present itself in another form, thus: a building erected some years ago has ceased to return a proper income on the amount invested, owing to changes in the character of the section or in the demand for that class of building, or it may be that taxes and fixed charges absorb too great a proportion of the gross income. What is to be done to remedy these conditions? Shall the old building be removed and a new one better suited to the locality be erected, or shall we remodel the old building and alter it to suit changed conditions? Either decision involves the expenditure of a considerable amount of money; which will be most profitable?

#### EXAMPLE OF THE COMMERCIAL PROBLEM.

A concrete example of the commercial problem may be cited in the following instance:

A prominent site in Jersey City, occupied by an old and well-known hotel, was acquired by a Trust Company, who wished to use it in the most profitable manner for



the transaction of their own business. There were four suggested ways of improving the property: first, to remodel the old building and to continue using it for hotel purposes, altering the ground floor to provide accommodation for the Company's banking room; secondly, that the old building be removed and a fireproof building for office and hotel purposes provided; thirdly, that the old building be removed and a one-story building for the sole use of the Company take its place; fourth, that a building should be erected, the ground floor of which would accommodate the Company, the rest of the floors being rented for offices.

The first plan was rejected because it was found that the cost of reconstructing the old building would be almost as much as that of providing an entirely new structure and the result would be far inferior in accommodation and convenience.

The second plan was also rejected because it was estimated that a first-class hotel and office building as proposed would be very costly, there would be too great a disproportion between the cost of the building and the value of the land, and as the charges for accommodation would have to be almost equal to those of an hotel of similar class in New York City the probability was that those willing to meet these charges would prefer to go to a New York hotel.

The high rent which would fall upon the Company if they adopted the third plan, owing to the cost of the land and the building, resulted in its rejection.

The fourth plan was recommended and adopted, the prevailing rents and the demand for office space in the neighborhood were carefully studied, and on these were based the size of the offices, the number of stories of the building and its proposed cost, which established the class of construction and the amount to be spent on decoration.

The building erected from plans based on this general idea has more than fulfilled the expectations of its owners and may be regarded as a successful commercial building.

The commercial problem in buildings may be divided into two separate parts; the real estate problem including the study of the site, its surroundings and accessibility, the probability of changed conditions and of future competition, in other words, the exterior factors; secondly, the building problem proper, which considers the cost, the number of stories and size of the building, planning, accommodation, number of elevators, if any, mechanical appliances, etc., these being the interior factors to success.

## CHAPTER II.

### EVOLUTION AND GROWTH OF CITIES.

Effect of modern transportation on cities—The line of growth is largely influenced by transportation facilities—Economic area of cities differs from political area—Ground plan of cities—Cities grow more complex and their sections tend to become distinctive—Growth and crystallization of sections—Distribution of different sections—Factors establishing the character of new sections—Sections of changing character—Classification of sections—Classification of buildings—Private residences, multiple or collective residences, business buildings, semi-public buildings, public buildings.

**A** BRIEF survey of the evolution and growth of cities will enable us to reach a better understanding of the place which the individual building holds in the aggregation of structures of which it is a unit.

In former days the growth of cities was restricted by the necessity of defense, the inadequacy of means of communication and other factors, and the growth took place gradually and continuously along the roads communicating with the surrounding country, as well as contiguously to those sections already built up. Cities still grow along the lines of communication with surrounding territory, these being at the present time the different transportation systems; the continuity of growth is not so much in evidence, however, as low-lying and undesirable sections are avoided and suburban sections formed at outlying points.

Cities accommodate an increased population in two



RESIDENCES RECONSTRUCTED FOR BUSINESS PURPOSES.  
The street is not of sufficient strength to warrant permanent rentals from stores above ground floor.  
8th Street, near 5th Avenue, Brooklyn, N. Y.

different ways: by adding new buildings to their outer circumference and on the unoccupied land within the built-up sections; and by the reconstruction of sections already built up. The first method is more or less continuous, with, of course, cycles of greater or lesser activity; the second tends to be periodical and at greater or lesser intervals. The older cities, Paris, for instance, are said to have been reconstructed every two or three hundred years, until the Nineteenth Century, when this time has been much reduced. In modern cities, especially in this country, an average of fifty years at the most will witness an almost complete reconstruction of most sections. In New York some sections have been rebuilt after a commercial life not exceeding 25 years.

EFFECT OF MODERN TRANSPORTATION ON CITIES. THE  
LINE OF GROWTH IS LARGELY INFLUENCED BY  
TRANSPORTATION FACILITIES.

Cities grow along the lines of least resistance, which in most cases means the best transportation.

A glance at the map of the built-up portions of such suburban districts as the outlying sections of Brooklyn and the Bronx will show this very clearly. Brooklyn, for instance, reaches out in a narrow strip on either side of the Long Island Railroad beyond Jamaica to a distance of about fifteen miles from the center; the lands a short distance to the north and south of the railroad, which are not readily accessible, being still utilized for agricultural purposes.

There are two different classes of transportation influencing the movements and places of residence of urban population: city transportation which serves the city proper, either on surface, elevated or underground railroads, and suburban transportation which connects cities with outlying suburban districts and residential

settlements, either by electric railways, or by the suburban service of steam railroads.

Both urban and suburban traffic may be compared to a changing current flowing towards the city centers in the morning and away from them in the evening. Both these forms of transportation have been unable in many cities to keep pace with the rapid growth of population, and their inadequacy has frequently retarded and interfered with normal development.

The influence which modern forms of transportation will eventually exert on the growth of large cities is to a certain extent a matter of conjecture; so far, the result of transit conditions has been to concentrate the financial, wholesale and principal shopping districts and to increase their values by bringing them within the reach of a larger number of people; to distribute the residential community, except those occupying the purely tenement districts, over larger areas; to equalize the value of outlying suburban sections, and to emphasize the undesirability of low-lying and swampy land which formerly owed its chief value to its proximity to built-up sections.

#### **ECONOMIC AREA OF CITIES DIFFERS FROM POLITICAL AREA.**

The economic area of large cities frequently differs greatly from the political area, and may be said to comprise the territory within reach in the time which the average man engaged in business can devote to going and coming from his work; it can be roughly estimated in the larger cities at about one hour's journey or from twenty-five to thirty miles from the business center. The economic area of the City of New York, for instance, would include not only Manhattan Island, Brooklyn, Long Island City, and other territory absorbed at the time of the extension of its boundaries in 1898, but Jersey City, Hoboken, Newark, Elizabeth and other outlying towns and settlements.

#### GROUND PLAN OF CITIES.

Every city has a definite structure which, expanding more or less regularly along the lines of least resistance, is subject to modifications by external influences. The study of the ground plan of any city will enable us to ascertain the lines of communication with the exterior, the main arteries of internal traffic, the subordinate streets, the distribution of the different sections and their relation to one another.

#### CITIES GROW MORE COMPLEX AND THEIR SECTIONS TEND TO BECOME DISTINCTIVE.

As cities grow, they become more complex and their subdivisions more numerous, and at the same time these assume more distinctive characteristics; numerous residential sections spring up, attracting people of different degrees of wealth and of different tastes. Business sections of established character tend to attract industries and occupations similar to those already located there and to repulse others. The addition of new territory disturbs the center of gravity and adds its influence to the other elements impelling changes.

#### GROWTH AND CRYSTALLIZATION OF SECTIONS.

The expansion and growth of different sections may be compared to the crystallization of certain substances which, when released from solution, gradually assume definite form and character.

Eventually, in the largest cities, the subdivision of certain sections is highly developed. Thus, in a section devoted to the sale of hardware, on some streets will be found stoves, furnaces and other heating appliances, on others, agricultural or mining machinery, building hardware, etc. This condition is due mainly to the great saving of time when purchasers find ready at hand dif-

ferent competing houses selling the goods of which they are in need.

The attraction competing firms exert on one another applies also to general shopping districts, as well as to occupations such as gather round the different exchanges and banks in the financial district, and also to a certain degree to some of the professions; some streets, for instance, such as parts of Madison Avenue in New York City and Clinton Street in Brooklyn, become occupied for doctor's offices, and almost the entire ground floor accommodation is devoted to their uses.

#### DISTRIBUTION OF DIFFERENT SECTIONS.

The distribution of different sections depends on: 1, topography; 2, prior establishment; 3, transportation; 4, effectiveness of the demand of different utilizations; 5, their relation to one another.

The financial section, which is of marked importance only in the largest cities, is generally to be found at or near the starting point, or the original center of gravity, and is hard to move.

The highest class residential sections are established on land of moderate elevation, free from nuisances such as the noisy traffic of street car lines. They attract high class shops which endeavor to be near as possible to their customers; they also attract churches, theatres, clubs and similar attendant buildings.

The medium class residential sections are also attracted by land of moderate elevation, but depend to a greater extent on good transportation, and to a lesser degree on absence of nuisances. They also cause the establishment of local shopping streets and create a demand for churches, theatres, clubs, etc., for the use of their occupants.

The cheaper dwellings or tenements utilize land in



proximity to factories, warehouses, and shops, which are often intermingled with buildings used as dwellings; others form dense settlements along transportation lines. Every improvement in transportation tends to strengthen these outlying settlements, whose inhabitants are willing to spend the extra time necessary to reach their employment and to pay the cost of the daily journey in return for cheaper rents and less crowded conditions.

Shops catering to local trade follow and press on the different residential sections, whilst those general shopping sections which serve a larger territory are dependent to a greater extent on transportation, which is necessary to bring their customers to them and they tend to concentrate in central locations. The largest shopping sections create a demand for light manufacturing establishments, warehouses and stables or garages in their immediate vicinity.

Commission and wholesale houses, which draw their trade largely from the surrounding country and are only partially supported by local buyers, congregate in sections which are accessible to their customers and where they have proper transportation facilities for the delivery of their goods.

The location of warehouses and factories is governed by the need for cheap land and access to transportation lines.

The less desirable lands are frequently used for the storage of articles of large bulk, like coal, stone, brick and lumber.

The location of these different sections and the areas they cover is constantly shifting, some of them offering greater resistance to changes than others. There exists a constant tendency to the displacement of one class of utility by others which can pay higher rentals, especially when their presence is detrimental. For instance, the

advent of shops in the high class portions of Fifth Avenue, New York City, has caused the steady northward movement of Fifth Avenue residences, with which all New Yorkers are familiar.

#### FACTORS ESTABLISHING THE CHARACTER OF NEW SECTIONS.

It is frequently difficult to decide what will be the future character of new sections established in outlying districts. This depends to a great extent on the class and character of the buildings first erected and on the character of their occupants; also on transportation facilities and on the improvements provided, such as sewerage systems, gas, electric light, water; the absence of nuisances, and restrictions preventing their advent are also factors of great importance. Those outlying sections which have been most successfully built up have been the result of capitalistic handling on a large scale, have included a sufficiently large territory, and have been supplied with needed improvements and their character has been established from the start.

A good residential section may be seriously injured if its only convenient approach is through poor or undesirable property, even though this is not near enough to affect it by proximity. People object strongly to being brought into contact with sordid and unpleasant surroundings, especially when these may also be unhealthy.

#### SECTIONS OF CHANGING CHARACTER.

The competition of different utilities for the use of land, which is especially noticeable in central locations and is due to the greater demand brought about by increase of population and wealth, is the cause of the tendency to a constant increase in value of all desirable land in growing cities or towns. Land in sections of changing character may become more intensively used as when a residence section becomes devoted to apartment houses,

or it may be used for different purposes, as when shops and stores which establish themselves as closely as possible to their customers, encroach on them and cause them to move, transforming a residence section into one devoted to shopping.

It is noteworthy that whilst residence property is frequently being converted to other uses, shopping, business and tenement sections never revert to use for good class residences.

As sections change character and their principal buildings are reconstructed or removed, the attendant buildings, such as churches, clubs, theatres, frequently come into use for other than their original purposes, or are torn down to make place for more suitable structures.

High class residences in once fashionable neighborhoods come into use as boarding houses or tenement houses, or are reconstructed for shops or stores.

#### CLASSIFICATION OF SECTIONS.

The various sections in a city and the buildings composing them can be classified according to their use.

Although not always devoted to one special use, their prevailing utilization can generally be specified, but it is frequently impossible to outline their exact limits, as they encroach on one another and to a certain extent their boundaries intermingle.

The following table comprises the most important sections and indicates their uses:

Residence.	{	1. Highest class residential.
		2. General residential sections.
		3. Tenements or cheapest dwellings.
	{	4. Financial and office section.
		5. High class shops (General shops and department stores).
Business.	{	6. Other and local shopping centers.
		7. Wholesale and commission.
		8. Warehousing.
		9. Factories, etc.



#### CHANGES OF UTILIZATION.

- (1)—The old Crescent Athletic Club, Brooklyn, remodelled for use as Bachelor Apartments, Clinton St., Brooklyn, N. Y.
- (2)—A church in a neighborhood of changing character now used by the Department of Public Charities, Schermerhorn St., Brooklyn, N. Y.

Some cities have other divisions than these, such as political cities, which have some quarters devoted almost entirely to buildings for public uses, or University towns, where the college buildings and their dependencies constitute distinct settlements. In other cities racial conditions lead to additional classifications; thus the Chinese quarter in San Francisco, the French quarter in New Orleans, the Jewish and Italian sections in New York City. In general, these "foreign" settlements can all be classed as tenements, though there are some exceptions, such as parts of the French quarter in New Orleans.

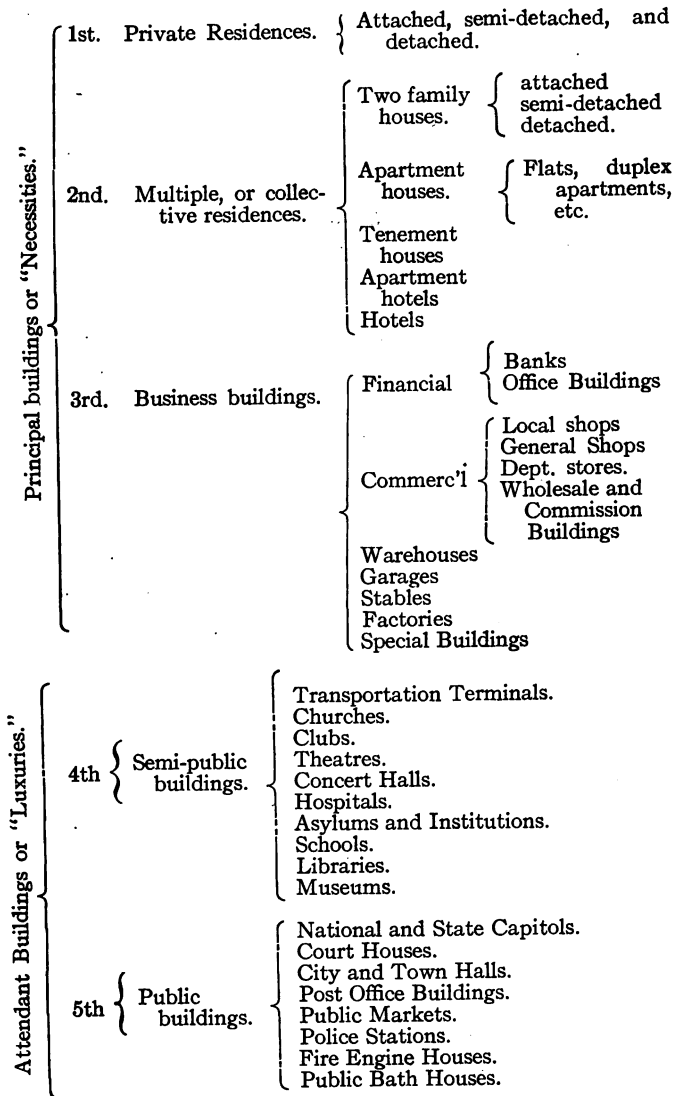
#### CLASSIFICATION OF BUILDINGS.

In order to simplify the study of the requirements of different buildings, it will be necessary to adopt some form of classification.

It has already been noted that buildings can be divided into necessities and luxuries, similarly they can be divided into: first, investment buildings, where they are erected mainly for the sake of the income to be derived from them; second, non-investment buildings, where the income to be derived from them is a secondary consideration.

Another method of classification would be to divide buildings into, first, the principal type, or those expressing the life of the city, viz., residences and business buildings; second, the attendant type, consisting of those which depend on the above for their existence and are located with reference to them; these include churches, schools, clubs, theatres, museums, etc.

The following general classification based on the above distinctions will be most useful for our purpose:



1. Private Residences.

These include all residences occupied by one family, whatever their size or cost. The larger and more expensive residences, especially those erected by their owners for personal occupancy, though included for our purpose amongst the first group, are seldom investment buildings, in that they are generally erected to meet special requirements, with no regard to their earning power.

2. Multiple or Collective Residences.

This class comprises all buildings for residence purposes occupied by two or more families; nearly all of them are erected for the purpose of earning an income on their cost, except perhaps in some instances, the so-called two-family houses, which are frequently occupied in part by the owner, who lets out the remainder.

3. Business Buildings.

The great majority of these are purely investment buildings, except that in some of them, such as those erected by banks or large corporations, partly or entirely for their own use, the direct return in rent, or its equivalent, is to some extent subordinated to the advertisement which the institution derives from the ownership and occupancy of a costly and imposing structure. It may be well to note here that there is no hard and fast division between the different classes, some buildings being used for several different purposes at the same time. Thus, residential flats and tenements and some apartment houses, though not of the highest grade, frequently have shops on the ground floor, especially when they are on traffic streets. Hotels, such as the Auditorium in Chicago, are combined hotel, office and theatre buildings.

#### 4. Semi-public Buildings.

In some cases the investment feature in these buildings is indirect or secondary. Thus, there is generally no direct return from a railway station proper; it is merely a terminal or distributing point for passengers, or freight traffic, and its value is in connection with the railway of which it is a part and without which it would be useless.

Theatres, concert halls, etc., are frequently erected purely for investment, except in the case of publicly owned buildings, such as many of those in French and German towns; and in buildings such as the Academy of Music in Brooklyn, where the main object is to promote good music or good acting; in these cases the return from the capital invested is of secondary importance.

#### 5. Public Buildings.

In these the investment feature is entirely superseded by questions of utility and frequently by the natural desire of communities to express their dignity and wealth through the medium of costly and monumental structures.

The fact that in public buildings any pecuniary loss is indirect and only affects the community at large should, of course, be no excuse for extravagant or useless expenditures or for failure to take into consideration all the utilitarian requirements of such buildings; this is rendered more important by the permanent character of many of them.



## CHAPTER III.

### EVOLUTION OF BUILDINGS.

Changes in materials used and in methods of construction—  
Increase in the number of stories and in the proportion  
of ground covered—Increase in accommodation of modern  
high buildings—Interchangeability of partitions—  
Saving of ground floor space in steel skeleton construction—  
Increase in complexity of modern appliances—  
Increase in number of buildings for special uses—Increase  
in cost of buildings—Foundations of high buildings—The  
tall buildings of ancient cities.

**A**LTHOUGH the construction of the ordinary city or country house does not differ greatly from that in use many years ago, except in the mechanical and sanitary appliances now employed, there have been great changes in the larger and more expensive city buildings, both in the materials used and in the methods of using them.

The most radical change in construction is that known as "steel skeleton construction." Where formerly the walls were built of brick and stone, and supported the building, the walling is now merely a shell suspended on a steel frame; floors formerly of wood or of brick arches supported by interior masonry walls, are now of light iron or steel construction with terra cotta or concrete filling; stairs of stone or brick are replaced by iron and cement and marble.

The most noticeable features in modern construction are the increase in the number of stories and the heights to which some buildings are carried, the rapidity

with which they can be erected, and the great saving in the weight of materials used in floors and walls.

The rapidity of construction results in a great saving in carrying charges; thus in a steel skeleton building erected in twelve months (they are frequently put up in less time), the carrying charges, including interest on the value of the land, and averaged on the cost of the building over the period of construction, including taxes and fire insurance, would be about four to five per cent; if a similar building took three years to erect, which would be a fair allowance of time for a building of masonry construction, the carrying charges would be from twelve to fifteen per cent, showing a saving in the first case of from eight to ten per cent in cost.

Prior to the introduction of elevators, buildings were seldom erected higher than six or seven stories at the most, this being the number which people were willing to climb. When elevators were brought into general use in this country in office and other buildings (the Equitable Life Assurance Society building being one of the first to make use of them in the year 1871), the possible height was raised to about ten stories, to which they were limited by the extra expense of additional stories and the loss of space due to the necessary thickness of bearing walls. The introduction of steel skeleton construction about 1888 enabled owners of property in congested districts, where land was valuable, to build much higher, and the limit was again raised when express elevators were introduced, until New York has recently witnessed the construction of the addition to the Singer building, which is forty-one stories, and that of the tower of the Metropolitan Life Insurance Company building, which is forty-eight stories high and 658 feet above the sidewalk, also the Woolworth building, fifty-one stories and 750 feet high.

## INCREASE IN THE NUMBER OF STORIES AND IN THE PROPORTION OF GROUND COVERED.

As cities grow, the land in the central sections becomes in greater demand and therefore more valuable, with the result that there is a tendency to utilize it to a greater extent by building over a larger proportion of it and to provide additional accommodation by building higher. Even where there is nothing to prevent a city from expanding freely in all directions, the necessity which exists for constant personal communication between those employed in certain sections, will bring about a concentration of such sections and consequent high buildings.

The methods of construction which have resulted in buildings of numerous stories have provided cheaper rents than would have obtained if the extra accommodation thus supplied were not available; thus in the financial section of London, where buildings rarely exceed six or seven stories in height, the rents above the ground floor are higher than in New York, where fifteen to twenty-five story buildings are comparatively numerous.

In the smaller towns it is unusual to erect on interior lots, buildings deeper than thirty-five to forty feet; in other words, to a depth of two rooms, which can thus secure light and air from the front and rear; also this depth will generally supply a sufficiency of floor space for the average shop. As land becomes in greater demand, both shops and other buildings extend to a greater depth, and where, as in residential sections, the building line has been established back of the lot line, the tendency is to disregard old building lines, and where not prevented by restrictions or other causes, to build up to the full extent of the lot, buildings thus extending both in front and rear.

The result of this desire for more intensive utiliza-

tion of land is seen in streets of changing character, where the new buildings will all move forward as well as extend backward, accelerating the changing conditions by pocketing and destroying the value of those which continue on the old building line.

In some countries the adoption of arbitrary building lines is not permitted and the rights of the owners of existing buildings are safeguarded, though, perhaps at the expense of possible increased accommodation.

#### INCREASE IN ACCOMMODATION OF MODERN HIGH BUILDINGS.

Where formerly masonry construction necessitated brick division walls, these are now replaced by columns which take up much less room. Elevator enclosures, partitions, etc., are all reduced to a minimum, giving the maximum amount of rentable area.

In office buildings, where it is desirable to secure the greatest possible amount of natural light, especially where the offices are deep, steel skeleton construction has made possible and encouraged the setting of window frames nearer the exterior surface of walls, thus giving better light. In masonry buildings it was thought necessary for æsthetic reasons to provide deep embrasures in order to carry out the effect of solidity of construction even at the expense of free admission of light.

The following example will show the great increase in accommodation rendered possible by steel skeleton construction. The old houses on the site of the Bowling Green Building in New York, averaged five stories in height and their total gross accommodation was about 80,000 square feet; the new building has a gross floor area of 367,500 square feet or 291,000 square feet of rentable area.

## INTERCHANGEABILITY OF PARTITIONS.

Another very valuable feature of steel skeleton construction is the interchangeability of partitions; these, supporting nothing, but being carried on the steel frame work, can be moved at will, making easy, at slight expense, the rearrangements of offices, to suit the demand of tenants.

## SAVING OF GROUND FLOOR SPACE IN STEEL SKELETON CONSTRUCTION.

Whilst accommodation above the ground floor can be increased by the erection of additional stories, ground floor space cannot be increased, and as it is the most valuable accommodation in buildings in financial and retail store sections, it is important that it should be utilized to the greatest extent possible. Steel skeleton construction has rendered unnecessary the great waste of ground floor space which was unavoidable in buildings in which walls, piers and columns were of great thickness at this level, and it has also produced a saving in accommodation on the other floors of high buildings, diminishing in the upper stories and least on the top floors.

The saving of floor space which can be accomplished by the use of steel skeleton construction is lessened in some cities by building laws which fail to recognize the true nature of this form of construction and insist on unnecessary thicknesses of walls.

## INCREASE IN COMPLEXITY OF MODERN APPLIANCES.

Even in the ordinary dwelling houses there is a marked change in mechanical and sanitary appliances. Modern methods of plumbing in which all pipes and fixtures are exposed and readily inspected and cleaned, are a great advance over those prevailing even twenty years ago; in addition, even inexpensive dwelling houses,

flats and apartments are provided with electric and gas light, steam, hot water or hot air for heating purposes, hot water for baths or other fixtures, electric bells, telephones, dumbwaiters, etc., all these labor saving devices adding to the comfort of the occupants and reducing the cost of service.

Modern office buildings, hotels, apartment hotels and other similar buildings are now in most cases provided with elaborate plants which will probably include some or all of the following: passenger and freight elevators, electric, hydraulic or steam; pumps for house supply and for fire service, steam heat and electric light plants, apparatus for refrigerating, filtering and ice-making, fans and ducts for ventilation, telephone service, etc., in addition to the complicated service necessary for a complete system of sanitary appliances.

#### INCREASE IN NUMBER OF BUILDINGS FOR SPECIAL USES.

Not only have buildings become structurally more complicated, but there has been a great increase in the number of buildings for special uses, some called into existence by modern inventions, such as telephone and telegraph exchanges, power plants, electric light buildings, automobile garages, etc.; others due to the increasing complexity of municipal regulations in large cities, such as buildings for Bureaus of Charities, and of Correction, Public Libraries, Bath houses, Municipal ferry houses and Bridge terminals, etc.; others again are due directly to the increasing complexity of society and to the tendency to the division of labor; such would be office buildings for general and for special purposes, clearing houses, exchanges, churches for different denominations and sects, synagogues, clubs of all kinds, political, social and athletic; buildings for scientific societies, etc.

Some of these buildings are the product of new conditions, many of them call for special requirements; in

some instances, such as in the design and installation of mechanical and power plants and in the erection and equipment of theatres, a great deal of special knowledge is required, the services of expert structural and mechanical engineers and electricians being needed.

In many cases architects, following the general law of progress which calls for the specialization of knowledge, devote themselves to special branches of architecture, some to ecclesiastical work, others to office buildings, others again to the designing of theatres, of breweries, or of private residences.

The increase in the complexity of modern buildings may well be illustrated by comparing the shop of olden times with the modern department store; the former consisting of an ordinary house with the front open towards the sidewalk or street, where the apprentices advertised their masters' wares (frequently made on the premises) by calling the attention of passers to their merit; the department store, with its acres of floor space, covered with goods of all kinds from all quarters of the globe, which maintains a highly paid managerial staff and advertising department and an army of salesmen and saleswomen, as well as mechanics, engineers, electricians, etc., and where one can buy anything from a paper of pins to a steam launch, which maintains a telephone and telegraph service in addition to its other departments, is frequently provided with a restaurant where it lunches several thousand people daily and sells in one day more goods than many shops do in a year.

#### INCREASE IN COST OF BUILDINGS.

Accompanying the increasing complexity of buildings, is a great increase in the cost of erection. This is partly due to the increased cost of all labor and materials entering into their construction, and partly to the modern

improvements demanded by all classes of people. The construction and the sanitary appliances of all grades of buildings in cities, from the tenement house to the most costly building are regulated by building laws; unsafe and unhealthy buildings are to a great extent eliminated and the tendency is for municipalities to insist more and more on sanitary housing conditions, especially for the poorer classes, who are always apt to suffer from the greed of unscrupulous builders.

Another reason for increased cost is that it has been found that the unit of accommodation is cheaper in large than in small buildings, owing to the smaller amount of space required for stair halls and light wells; this has resulted in a great increase in the average size as well as the height of office buildings, apartments and tenements.

#### FOUNDATIONS OF HIGH BUILDINGS.

The height which buildings in New York City and other cities in this country have attained, has necessitated great changes in the nature of the foundations supporting them. It was formerly considered sufficient to carry them to a depth of fifteen or twenty feet, spreading the footings sufficiently to distribute the weight. The high buildings erected on the marshy soil of Chicago brought into use so-called "grillage" foundations, where iron and concrete were used to further distribute the weight of the superstructure, resulting practically in some cases in their being carried on rafts of these materials, the weight being thus distributed over the whole surface of the land built on.

In New York City the difference in the subsoil has led to the introduction of caisson foundations, which are large piles of concrete carried to a great depth, frequently 80 to 100 feet, and which in the heaviest buildings now reach bedrock. The introduction of these methods of



supporting buildings has largely added to their cost and has also resulted in the construction below ground of three or even four stories, which can be used for storage as well as for the necessary mechanical appliances.

#### THE TALL BUILDINGS OF ANCIENT CITIES.

The erection of tall buildings is not new, though former modes of construction prevented them from being carried to the height made possible by steel skeleton construction.

We are told that, in Ancient Rome and in Constantinople at the time of the Roman Emperors, the surrounding of these cities with walls for the purpose of defence had forced the builders of those days to seek to accommodate the population by building as high as their knowledge of construction and the restrictions of their building laws or regulations would allow.

We are informed that buildings of eight, nine or even ten stories were not uncommon and that, in order not to exceed the height limit to which they were permitted to build and for economy, it was customary to diminish the height of the stories until the upper floors did not provide sufficient head room to allow their occupants to stand upright.

## CHAPTER IV.

### THE COMMERCIAL PROBLEM IN BUILDINGS.

The commercial problem and its two distinct aspects: land imperishable, tending to increase in value; building perishable, subject to depreciation—Building is complementary of the land covered—The problem in new buildings.

THE majority of buildings are erected to serve some useful purpose; they may be used as residences, for the transaction of business, or for the storage or sale of merchandise; they represent moreover, the investment of capital from which a proper return is desirable. The more nearly they fulfill their utilitarian requirements, the more successful they are apt to be financially, and the commercial problem involves the study and classification of those factors which observation and experience point out as conducive to usefulness and financial success.

In order that we may reach a proper solution of this problem it is necessary to study not only the building itself, but the site on which it stands; its surroundings, means of access, situation relative to other buildings, its probable life and the possible changed conditions which it may have to meet; it must be considered as a unit in the aggregation of buildings of which it is a component part, by which it is influenced, and on which it exerts a counter influence.

Utilitarian requirements are present in any building

wherever erected, but they are more important and their study more pressing in growing towns and cities where new and improved structures are constantly being brought into competition with those already up, at the same time that new and growing sections compete with those already established.

There are two distinct considerations in this problem: the one dealing with the factors external to the building, such as the site, surroundings, approach, access, etc.; this may be called the real estate problem; the other, relating to the structure itself, its construction, the arrangement of parts, or plan, decoration, etc.; or the structural problem.

This differentiation calls attention to the important distinction existing between the two component parts of improved real property; the land, the area and position of which is fixed for all time, is imperishable, limited in amount, and in growing cities tends to have a scarcity value increasing with the demand for its use; the building, which can be made to yield an increased accommodation by increasing the number of its stories, is perishable, of limited commercial and structural life, can be removed, remodelled, or rebuilt, and depreciates in value as it approaches the term of its commercial and physical usefulness.

The real estate problem involves the study of the site on which the building stands or is to be erected, the relation it bears to other competing sites, the character of the section and the possibility of changes in that character, the means of access and of communication with other sections, restrictions, if any, and the class and character of building which will be best suited to a given site and locality.

The structural problem deals with the building itself; it considers the relative importance of the component

parts of the building, their arrangement and relation to one another, the means of communication with the exterior and between the different portions of the building; the questions of material, of construction, mechanical appliances, decoration, etc.; it also takes into consideration the relative cost of different materials and the advantages to be gained by the use of different forms of construction, the strength and carrying capacity of floors, walls and piers, and the necessity for conforming to the requirements of local building and tenement house laws, fire insurance and municipal regulations.

#### BUILDING IS COMPLEMENTAL OF THE LAND COVERED.

A building is complementary of the land on which it stands; without it, the land has no earning capacity except for the storage of the cheaper forms of goods, such as coal, lumber, iron, etc., from which use only a small income can be derived.

Once erected, the productiveness of the land can only be realized through the building, which, if unfitted to the site, or to its proposed uses, poorly planned, or otherwise unsuitable, tends to destroy in part, or entirely, the earning power of the land, which can then be regained only by the reconstruction or removal of the building.

Where land is scarce and of great value, as in cities, especially in the most desirable locations; it should be used to the best advantage, and so built on as to bring out its full earning capacity.

#### THE PROBLEM IN NEW BUILDINGS.

In the case of new buildings, there are two ways in which the commercial problem may present itself. A building of a certain size, capacity and for certain uses may be required and the most suitable site for such a building may be under consideration. The real estate factors in this case are predominant and the problem

consists in ascertaining from the sites offered which will be best suited to the particular business and the known requirements of the building. It must not be understood that it is claimed that such a site can be determined absolutely, but the study of commercial requirements calling attention as it does to the factors needing consideration, enables us to weigh the merits of different sites and their suitability to a building for specific uses.

Or again, the site may be established and it may be necessary to determine the proper building to be erected on this site, of which the surroundings, means of access, etc., can be ascertained by inspection; here both real estate and structural considerations are involved.

## CHAPTER V.

### COMMERCIAL VALUE OF BUILDINGS.

The commercial value of real property on which the buildings are normal is represented by the net rent capitalized—Normal buildings—Normal buildings should be of normal cost—Commercial value differs frequently from cost—Fire insurance companies and sound value—Instance of gradually decreasing value of similar buildings on different sites—Comparative value of ground floor and other accommodation in different classes of buildings—Buildings in sections of changing character; taxpayers—Special buildings for particular uses—Misplaced buildings cause of destruction of capital—Investments of diminishing value—Buildings from which the net income is abnormally low—Commercial life of buildings—Buildings from the investors' standpoint.

THE commercial value of a building is its market value in normal times and under normal conditions. In times of great real estate activity and increasing values, property frequently sells for more than it is worth, owing to the discounting of future values which occurs at such times and to the fact that in a rising market, for real estate as for other commodities, prices are pushed up by speculators who are willing to pay almost any amount, regardless of income, expenses or other considerations, if they think that some one else will take the property off their hands at a profit.

THE COMMERCIAL VALUE OF REAL PROPERTY ON WHICH  
THE BUILDINGS ARE NORMAL IS REPRESENTED BY  
THE NET RENT CAPITALIZED.

The market or commercial value of real property covered by normal buildings and in normal times is obtained by capitalizing at the proper rate, the net rental

obtained, after deducting all expenses for maintenance, service, fire insurance, depreciation, etc.

The two distinct characteristics of land and buildings, which have already been pointed out, viz., the limited area of land, its imperishability and tendency to increase in value through increased demand, and the constant depreciation and limited life of buildings, together with the possibility of increasing the accommodation they furnish by building higher, find expression in the custom which prevails in most countries of capitalizing land at a lower rate than buildings.

Thus it is customary to estimate the cost of the building less depreciation and to allow from five to seven per cent. on this amount as the income due from the structure; the balance of the net income capitalized at from three to five per cent. gives the value of the land. The success of this method depends on the permanence of the income; on the building being fairly well suited to its location, or in other words, a normal building; on the proper allowance for depreciation being ascertained, and on the correctness of the interest return required from land and building. A knowledge of the rental obtained for a series of years will permit a correct estimate as to its permanence; the suitability of the building to its site can be ascertained by inspection and by comparison with neighboring buildings; experience will indicate the proper allowance for depreciation, and a knowledge of the prevailing rates of interest for real estate and other forms of investment will be required to enable correct judgment to be used in the rate of capitalization to be employed.

The difference of interest returns expected from land and from buildings draws attention to the higher net return which should be obtained from property when the value of the building is greatly in excess of that of the land.

Thus, when land and building are of equal value and the interest return should be respectively four and six per cent., the combined net income should equal five per cent.; but if the building is worth five times the land value, the return should average five and two-thirds per cent.

This point will be considered again under the head of "Investments of Diminishing Value."

#### NORMAL BUILDINGS.

Buildings which are suited to the site on which they stand, which are in keeping with their surroundings, and which meet the requirements of their occupants, may be called normal buildings. Thus in a residential section composed of residences averaging \$10,000 in value, the normal building is one which does not vary too much in either direction from this amount; a \$100,000 or a \$1,000 residence in such a section would not be normal on account of their great divergence from the average cost; neither would an office building in such a section be normal.

Other instances would be a four or five story old-fashioned office building in a financial district, where land is of high value; or old-fashioned residences in sections changing to business; these buildings cannot return an adequate rental on the value of the land they cover, and their value consists in their earning power during the limited period that they are likely to stand, less expenses of maintenance and taxes on the buildings proper.

If a building is not normal, proper allowances will have to be made in arriving at the commercial value.

Buildings in sections which have changed character since their erection, though still structurally sound, are frequently of nominal value, this depending on the



length of time they will probably continue in use and their net earning power over and above the taxes chargeable to them.

There is a tendency for similar buildings in similar locations to acquire equal values, just as there is for an equalization of rentals for similar accommodation, making it fairly easy to ascertain the normal rentals for a given unit of accommodation, either by the square foot, room or house.

NORMAL BUILDINGS SHOULD BE OF NORMAL COST.

The value of a building being its net rent capitalized, and its commercial life being generally shorter than its structural life, especially in growing cities, any wide divergence from the normal cost of similar buildings will result in a waste of capital.

Thus, abnormal expenses either for construction or decoration incurred in a building whereby no equivalent addition is made to net income, will result in a commercial value lower than cost.

In new buildings it is well to take into consideration not only the proposed use of the building and the competition of similar structures, but its probable commercial life, which for the average building in the average city may not exceed fifty years; this will frequently have a very decided bearing on the amount to be expended on construction.

It is, of course, necessary to make an exception of certain buildings of a more public or monumental character, especially those which tend to dominate their surroundings, such as the more important state or municipal buildings, exchanges, transportation terminals, public libraries and the larger churches.

It is interesting to note that at the present time a discussion is going on as to the extreme cost and difficulty which will be experienced when the necessity arises for

removing some of the iron and concrete buildings now in course of construction, these being not only of a very durable nature, but very hard to demolish.

Not only should the normal building not be too costly, but it should also not err in the opposite direction. Buildings of flimsy and perishable construction are subject to rapid depreciation, the cost of maintenance and repairs is very high, and those deficient in necessary equipment and improvements suffer in competition with their better designed and better built neighbors, showing lower rentals and greater carrying charges.

#### COMMERCIAL VALUE DIFFERS FREQUENTLY FROM COST.

Commercial value may be, and frequently is, less than the cost price to replace a building. It may be more than the building cost originally when the price of labor and materials has increased since the time of erection. It is less than the cost of erection when the income derived from it is insufficient to give a proper return on this amount; this may be due to the depreciation which takes place from use, the action of the elements, or natural decay; or in other cases to wrongful location, poor planning or faulty construction.

There are many other causes tending to reduce the commercial value of buildings below what it would cost to reproduce them. Some of them are due to mistakes made at the time of building, others to conditions changing after the building has been erected; some can be avoided, others can be provided for (as when a building is erected which is convertible, to meet possible changed conditions), others again are unavoidable.

#### FIRE INSURANCE COMPANIES AND SOUND VALUE.

The difference which exists between cost and commercial value is recognized to a certain extent by fire insurance companies, who use the term "sound value"

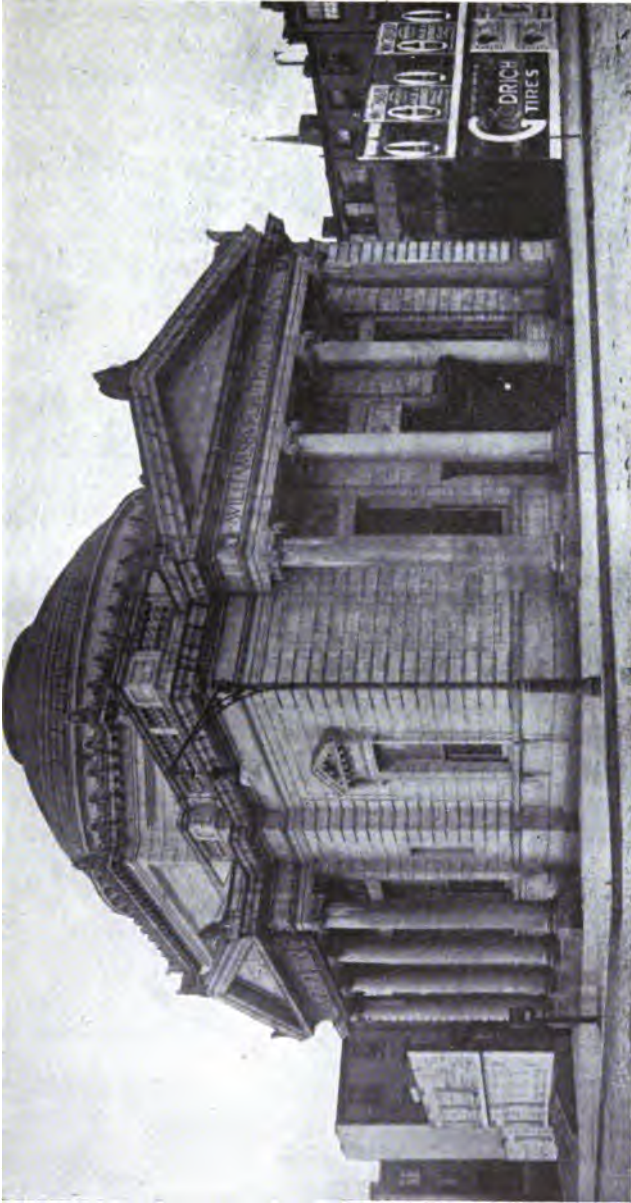
or "actual cash value," which has been described in a legal decision on fire insurance as "the cost of rebuilding a similar structure at present prices of labor and materials, less depreciation from any legitimate cause"; the same decision goes on to say that "it sometimes happens that the cost of reproduction, less depreciation, does not represent the value of the building at the time of its destruction. When buildings have been constructed for a particular purpose, and on account of an unfavorable location or a failure of the business for which they were intended they have become practically useless, the sound value of such buildings is very much less than the cost of reproduction."

INSTANCE OF GRADUALLY DECREASING VALUE OF SIMILAR BUILDINGS ON DIFFERENT SITES.

To convey a clearer idea of the difference in value of similar buildings in different locations, a building may be imagined costing say \$50,000, which placed in certain locations in New York City would be worth all it would cost to build. By shifting it to different sites, the building would have a gradually decreasing value, depending on its location; in some places it would be worth only what the materials of construction would sell for, less the expense of removal, or merely a nominal value.

COMPARATIVE VALUE OF GROUND FLOOR AND OTHER ACCOMMODATION IN DIFFERENT CLASSES OF BUILDINGS.

The introduction of steel skeleton structures has made possible a great increase in the height of buildings with much less loss of ground floor space than occurs in buildings of masonry construction. As ground floor space is limited in area and cannot be increased, and ground floor rentals in certain sections are from five to



A GOOD EXAMPLE OF A MISPLACED AND UNSUCCESSFUL BANK BUILDING. WILLIAMSBURGH BRIDGE PLAZA, BROOKLYN, N. Y.

Built off the line of traffic, under the mistaken assumption that a fine building would attract business. Assessed value, 1912, \$115,000. Offered to City of New York for \$72,450, or without the vault, \$69,000.

ten times the rentals of upper floors, the advantage of utilizing this space to the greatest possible extent is obvious.

The ability to increase the accommodation of upper stories by building higher and the impossibility of increasing ground floor areas draws attention to the importance, on valuable land, of a very careful study of ground floor plans and the avoidance of any waste in this portion of the building.

In high class city houses, the floor immediately above the ground floor is nearly always of greater value than the ground floor itself on account of its greater privacy and of its removal from the dirt and noise of street traffic; an exception to this would be a house surrounded by its own grounds and where the building is sufficiently retired from the street to avoid the unpleasant effects of noise as well as the inconvenience of being overlooked.

In cheaper dwellings, the ground floor and that above are of nearly equal value, the odds being slightly in favor of the latter, except where the street is free from heavy traffic.

In high class apartment houses, the first floor is more valuable than the ground floor, on account of its greater privacy and freedom from noise and dust. The first floor again is more valuable than those above because of its freedom from dependence on elevator service where provided, and where there is none, because it is easier of access. Exceptions are when the ground floor has value for other than residential uses; for business purposes, such as shops or offices, or for semi-business, such as doctors' or other offices.

In the cheaper grades of apartments and in tenements, the first floor has a value slightly in excess of that of the ground floor, except when the latter is removed from the street by means of steps, in which case the

ground floor may be somewhat more valuable on account of its greater ease of access; the difference, however, is not great.

For offices, banks and similar utilizations, the value of the ground floor is greatly in excess of that of the upper floors on account of its greater accessibility and its value for advertising purposes. Even in elevator buildings, especially in expensive locations, the floor immediately above the ground floor will have a considerably greater rental value on account of greater accessibility, and greater advertising value than those over it, which tend to be of equal value throughout. In non-elevator buildings, used for business purposes, the value of the accommodation will decrease in proportion as it is higher up, on account of its being less accessible from the street.

In shops and stores in good demand, ground floor values are greatly in excess of those above; the proportion increases as the location attains greater scarcity value. In cheaper locations the difference is not great, and where there is but small demand for stores, the rental value will tend to similarity for the two floors.

In apartment houses in Paris the relative value of different floors is frequently emphasized by placing between the shops on the ground floor and the first floor apartment a mezzanine story called "entresol," which is used for cheap business or inferior apartments.

We may summarize by stating that for business purposes the ground floor is of greater value than the upper floors, the excess value increasing rapidly with the intensity of the demand for accommodation; in residence property the excess value is generally for first floor accommodation, the proportion increasing as the property becomes of a higher class.

BUILDINGS IN SECTIONS OF CHANGING CHARACTER.  
"TAXPAYERS."

When the character of a section changes, buildings must either be easily convertible to meet the new demand or they may have to be practically reconstructed or entirely removed. Thus one sometimes sees churches, situated in sections from which their congregations have moved, used for business purposes.

It is well not to make too expensive alterations in buildings located in sections of changing character until the nature of these changes is fully understood; for where several different utilities are competing for a given section, it may take some time to determine which will eventually secure possession of it.

It is quite common in growing cities, where there is some uncertainty as to the ultimate character of a section, or when a building suited to changing conditions would be in advance of the needs for it, to erect what are known as taxpayers, viz., buildings which will earn a sufficient income to repay their cost of erection during their probable life and something over to meet the taxes on the land as well as on the buildings. In some cases these taxpayers show a larger net return than neighboring high buildings.

SPECIAL BUILDINGS FOR PARTICULAR USES.

Those buildings for which there is a great demand, such as residences suited to the needs of and within the reach of the average house buyer, apartment and tenement buildings of not too large size, office buildings of average size and cost in a suitable section, shops in a shopping district, etc., are apt to approach nearest in commercial value to their cost to erect. Buildings for special uses, for which the demand is limited, frequently sell far below the cost of reproduction, especially where it is difficult to convert them to other uses for which



"TAXPAYERS," FLATBUSH AVENUE, BROOKLYN, N. Y.—When the ground floor is valuable and there is no strong demand for accommodations on upper floors, taxpayers (so-called) are frequently very profitable, carrying charges being reduced to a minimum.



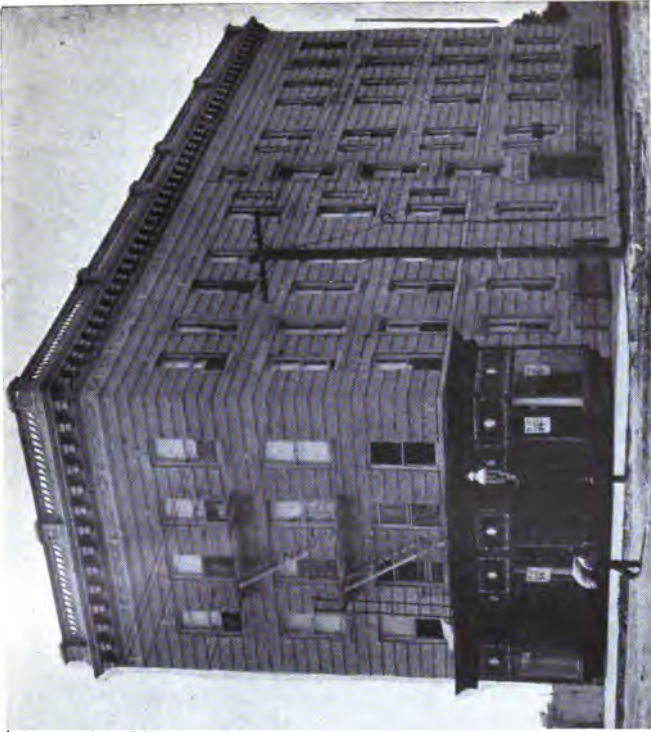
there is a larger demand. This is especially the case with large buildings suitable for occupancy by one tenant and which are difficult to subdivide. Thus, a department store in a section where the demand for such a building is limited, if vacated by its tenants, will probably be very hard to rent, and if offered for sale will frequently find no market except at a great reduction from its original cost.

As an example of loss sustained in a building erected for special uses may be cited the Germania Club Building on Schermerhorn Street, Brooklyn, which cost to build, including the land, in 1892, \$130,000, and was sold in 1907 for \$90,000, or in 15 years a loss of \$40,000 or a little over 30 per cent. In this case the character of the section remained about the same during this time and the building was sold to another club, who could afford to pay a better price for the property than it would have brought if converted to other uses, in which case the loss would have been considerably greater.

#### MISPLACED BUILDINGS CAUSE OF DESTRUCTION OF CAPITAL.

Loss of capital in building investments occurs more frequently through misplaced buildings than from any other cause. A misplaced building is one which is out of harmony with its surroundings or unsuited to them; either it is of a wrong class, such as a factory situated in the midst of a residential section, or it may be too costly for the neighborhood, such as a large and expensive dwelling amongst others much smaller and of cheaper character.

Buildings are frequently misplaced through being erected in advance of the requirements of a neighborhood, though, if they are in the line of growth, they may become in time the proper type. Thus a four or five story brick tenement in a neighborhood of small frame tenements, where the demand for increased ac-



- (1)—A SPECIAL BUILDING. ORIGINALLY THE GERMANIA CLUB, BROOKLYN, N. Y.—Its sale years after erection resulted in a loss of over 30 per cent. of the money invested. A poor type for conversion to other uses.
- (2)—A MISPLACED BUILDING, BROOKLYN, N. Y.—Erected in advance of the demand: "top heavy," about ten times the value of land built on.

accommodation is urgent, may be justified, whereas a similar building erected in a section where the demand is for cheap detached residences would be out of place.

Buildings misplaced at the time of erection generally consist of single structures or of small groups, and the more unsuited they are to their surroundings the greater the loss of capital they are apt to cause; mistakes of location are more important in growing cities, on account of the competition of new buildings, than in smaller settlements, where the competition is less keen. Where the growth is slow tenants will make the best of existing conditions, as there is nothing else likely to be offered, but where new buildings are constantly being erected, they compete for the tenants of older buildings, offering them better facilities and more modern improvements and tending to attract the best and most active class of tenants who are able and willing to pay for the best accommodation.

Changes in the character of a section are liable to render all the buildings in the section unsuitable; they will then gradually be replaced by others more in keeping with new requirements.

The cheaper the improvements, the more readily a section will adapt itself to changed conditions by wholesale reconstruction. Thus in a neighborhood built up with small frame houses, where pressure of population creates a demand for more accommodation, the oldest and cheapest will be removed first and those in the best condition last. If the section is built up with a more expensive and better class of house, the change will be slower, and greater resistance to reconstruction will be offered, which may even result in forcing the erection of superior accommodation in less desirable locations.

Instances of this are frequently seen where in high class residential sections the buildings are too good to be removed and they become utilized for boarding houses

and tenements, their former occupants moving to locations where they can secure a more modern class of improvements.

Where a building is of a class entirely unsuitable to a neighborhood, such as a good residence in a tenement section, the remedy is to remove it, unless it is "convertible," when it may be possible to remodel it to suit the conditions. Instances of remodelled buildings are most frequently met with in sections which have changed character, where we find residences altered into office buildings, churches into stores, etc.

#### INVESTMENTS OF DIMINISHING VALUE.

When the proportionate cost of a building is in excess of four or five times the value of the land, this proportion is evidence that the building is unsuited to the locality or ahead of the demand, and the result is generally what is known as an investment of diminishing return, where the increase in the value of the land which takes place in any growing city through increased demand is less than the depreciation of the building.

For instance, if on a plot of ground the market value of which is \$5,000 a tenement building costing \$50,000 is erected, the land may double in value in ten years, or be worth about \$10,000; during that time a depreciation of three per cent. per annum, which is moderate for such a building, would result in a total depreciation of \$15,000, giving a total value of land and building at the end of that period of \$45,000, against an original investment of \$55,000.

Amongst real estate dealers a property such as described above is referred to as "topheavy," showing their appreciation of the result of the disproportion of building to land.

**BUILDINGS FROM WHICH THE NET INCOME IS ABNORMALLY LOW.**

Instances of buildings from which there is little or no net income are sometimes met with in sections of changing character. Tax values are slow to accommodate themselves to falling rents and prices, owners do not wish to acknowledge that their property is depreciating in value, and taxes and the necessary charges for maintenance may leave no margin.

The commercial value of buildings in such sections is doubtful and depends on the uses to which the property may ultimately be put; sometimes the removal or reconstruction of the building may be necessary to enable some income to be extracted from the land.

Buildings where the fixed charges are very high in proportion to the gross rents are very apt in times of commercial depression to show little or no net income. Such are the type known as apartment hotels and also in some cases transient hotels. The taxes and cost of maintenance and service in such buildings frequently amount to fifty or sixty per cent. of the gross income, or in extreme cases to a larger proportion. The taxes have to be paid, the building heated, lighted, and good service maintained, whether there is only one tenant in the building or it is fully occupied. Any decrease in gross income due to the competition of similar buildings or to a lessened demand shows almost as large a decrease in net income, the cost of maintenance being practically fixed. Thus a decrease of thirty to thirty-five per cent. in the gross rental of such a building, due to decreased rentals and loss of tenants, would leave practically no net income.

**COMMERCIAL LIFE OF BUILDINGS.**

The commercial life of any building may be quite a different period of time from its structural life. The



(1) A MISPLACED BUILDING. CORNER OF BEDFORD AVE. AND FULTON STREET, BROOKLYN, N. Y. The lower floors were intended for a Department Store, for which there is no demand in this location. They have been vacant for a number of years, but having been subdivided in 1912 into smaller stores for which there is a demand, the ground floor is being rented. Cost in 1890 about \$325,000. Foreclosed and sold in 1908 for \$180,000.

(2) BUILDING ERECTED IN ADVANCE OF THE DEMAND. BROOKLYN, N. Y. "Top heavy" building, 12 to 13 times' land value. Will depreciate more rapidly than the lot will appreciate, resulting in a yearly decrease of total value.

structural life may be terminated in any one of three ways: by natural decay, by destruction by fire or earthquake, or by the removal of the building.

A building of which the structural life is far from terminated, reaches the limit of its commercial life when it becomes, through change in character of its location, or for any other reason, unfitted for the purposes for which it was erected, or is no longer able to earn a proper return on the land it stands on. Buildings which are structurally sound frequently have an insufficient commercial value and are removed to make place for others more profitable.

An instance of the brief commercial life of some structures in rapidly growing sections would be the Gillender Building in New York City, built about 1898, seventeen stories high, with an additional three stories in the tower, and which was removed in 1911 to make room for a more modern structure, this being one of the first buildings of skeleton construction which has been torn down. It has been estimated that the home office building of the Equitable Life Assurance Society of New York, which was erected in 1869 and 1887, at a cost of several million dollars, could have been removed before its recent destruction by fire and a modern building erected in its place which would show a better return on the cost of the property to date, plus that of the new structure, than the old building did on the amount invested.

#### BUILDINGS FROM THE INVESTORS' STANDPOINT.

The majority of buildings in cities represent capital invested for the sake of income, and mistakes either in the general class of building or in the structure itself result in a diminished income and loss of capital; thereby making them less desirable as investments.

The income from building investments varies with



APARTMENTS ON GRAMERCY PARK, NEW YORK. Open spaces which furnish permanent light and air encourage the erection of high buildings.



the prevailing interest rates for money; a general lowering of interest rates, extending over a sufficiently long period of time brings about an increase in the value of real property, where there is no decrease in rents; similarly, an increase in interest rates will decrease the capital value of buildings, unless it is accompanied by an increase in rentals.

The rate of income on capital invested in buildings varies greatly, depending on the degree of certainty of the return, the trouble necessary in looking after the property, the uses to which it is put, the depreciation the buildings undergo, and the speculative element involved in possible increased income and value.

In New York City, good class residences of moderate size and good class office or store buildings, not of too large a size, situated in well established sections, would probably be considered the best form of property, either for investment as in the case of the office or store property, or for investment or use in the case of residences.

In many classes of city property where the increase in population is rapid and land values are rising, the investment feature is accompanied by the probability of an increase in value, especially in the case of land inadequately improved which cannot be made to earn a proper income on its value until the buildings have been remodelled and replaced.

The ownership of landed property appeals to many people because it is something tangible that they can see and understand, thus differing from stocks, bonds and similar securities, the value of which is far more difficult to grasp and has to be taken at second hand. This condition frequently increases the demand for property, especially when after a period of depression and losses incurred in other securities people prefer to invest in something which cannot entirely disappear, even though it may show a diminished return on the investment.

## CHAPTER VI.

### THE REAL ESTATE PROBLEM, OR EXTERNAL FACTORS INFLUENCING THE COMMERCIAL VALUE OF BUILDINGS.

Surroundings, beneficial and detrimental—Accessibility; approach—Transportation—Topography—Street plan and shape of building plots—Comparative value of corner and inside lots for different uses—Blind streets—Street and sidewalk paving—Width of streets—Nuisances—Restrictions—Taxation and its effect on values—Legislative or municipal action—Influence of buildings on location and vice-versa—Interference with natural tendencies by artificial means—Summary of external factors, beneficial or detrimental to different classes of buildings, and comparative values of corner and inside lots for different uses.

**A**NY building is greatly influenced by the aggregation of structures forming the section of which it is a unit; they tend to determine its character and to establish its class. It is also affected by neighboring buildings, such as schools, churches, clubs, theatres, and by its surroundings, such as parks, open spaces, surface and elevated railways; some of these are beneficial, others detrimental to value.

High class residences are greatly benefited by being located in a section generally considered fashionable, especially when there are sufficient buildings of a similar class to properly establish the character of the section, and to resist the encroachment of undesirable neighbors, thereby ensuring a greater degree of permanence.

Residences are benefited by proximity to parks and open spaces, especially when these are made attractive

with flowers and shrubs and kept in good order; by parked streets, such as are more often found in Paris and other continental cities than in America; also by frontage on streets from which noisy traffic is excluded. A good outlook such as that from Riverside Drive in New York attracts high class apartments. Residences are also benefited by proximity to the churches and clubs used by the residents of the section.

Cheaper residential buildings are made more desirable by being within reach of the public schools frequented by the children of the neighborhood, though these schools are somewhat detrimental to the houses immediately adjacent and are a decided nuisance when situated in high class residential sections.

All residential buildings are injuriously influenced by nuisances, such as hospitals, garages, fire engine houses, factories, etc., their effect being more pernicious the higher the class of building. In the cheaper class it is sometimes difficult to determine whether the benefits afforded by having street car lines, for instance, close at hand is more than offset by the noise and dust which accompany them.

Parks and open spaces, to the extent that they interfere with the continuity of stores and shops are detrimental to the latter; but especially in congested office sections, where high buildings are in demand, they are beneficial on account of the extra light they afford.

Stores and shops are benefited by the presence of other similar buildings and more particularly so by proximity to those having an extensive patronage; also by hotels and theatres, especially when these have stores on their ground floor. Stables, factories, hospitals, schools, churches, etc., are detrimental to stores, as also to office buildings; these latter are benefited by nearness to the exchanges, banks and other financial institutions.

The occupants of some special office buildings have

need of constant communication with those of some other buildings, and are benefited by proximity to them; thus, lawyers' offices and court houses, brokers' offices and the different exchanges.

#### ACCESSIBILITY; APPROACH.

It is important that a building shall be easy of access; any impediment to this reacts on its value, as for instance, a building which can only be reached up a steep bank by a flight of numerous steps; where access is through another building, or where the building is below the street level and has to be reached by steps, or again where the only access is through a narrow alleyway.

Free access is sometimes interfered with where frequent deliveries of goods are made at the street entrance, especially where wagons are allowed to back up to the building over the sidewalk, thus impeding traffic. There is also lack of accessibility where the only approach is up a steep hill or through poor surroundings or on streets poorly improved or thinly built up and from which the snow will probably not be removed in the winter.

#### TRANSPORTATION.

The necessity which exists in cities for most men and some women to take daily trips to and from their places of business, the present tendency to freedom of travel, together with the concentration of the largest shops in central sections, necessitating the use of street car lines or other means of transportation for reaching them, has operated to the advantage of all property convenient of access to transportation lines. The greater the speed and comfort of the means of conveyance, the more the property is benefited. The converse is also true, and property not within easy reach of transportation suffers greatly by competition with that which is more favored in this respect.

On transportation lines having express stations, property is benefited in proportion to its nearness to them, except that in the immediate vicinity of these stations there is a tendency for small stores to be established even where the section is one of detached residences, this being detrimental to the property for residence purposes.

#### TOPOGRAPHY.

Residential sections especially are largely influenced by topographical considerations. Land of moderate elevation is nearly always preferred on account of the better facilities for drainage, better air, and in some cases the additional benefit of a view of the surrounding country. Low lying and swampy land is apt to be unhealthy, and should be avoided for these uses. Level land with easy grades is most suitable for business, especially where much hauling is necessary. Shopping streets can seldom be induced to extend up steep hills.

Though accidents of topography, when not too severe, are generally eliminated or greatly reduced in cities, by the grading down of land of more than average elevation, and the filling in of ditches, streams and ponds, the best residential sections will nearly always be found on land lying at the highest levels, land of average elevation being utilized for business purposes, whilst the lowest lying land will be occupied by transportation lines, factories, storage houses and other similar utilizations.

#### STREET PLAN AND SHAPE OF BUILDING PLOTS.

The plan of a city and the direction and width of its streets influence greatly the current of travel and thereby the disposition of sections and the character of buildings.

Diagonal streets, which are a convenience in reducing the distance between different sections, are apt to become main arteries of travel, but when they cut across a rectangular street plan at too acute an angle, they leave wide



**BUSINESS BUILDINGS ON UNION SQUARE, NEW YORK. An instance of the influence of open spaces upon the height of loft and office buildings.**

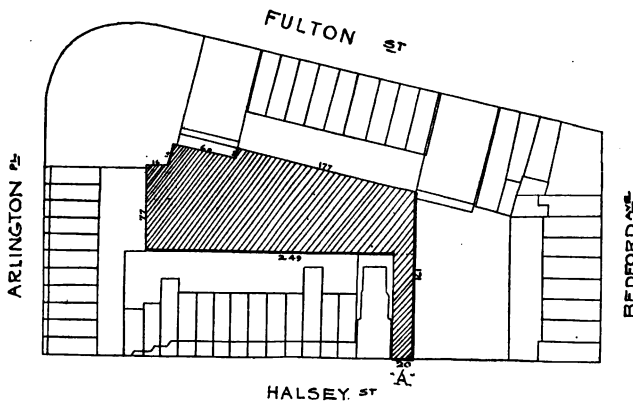
crossings which are objectionable for business purposes. When a diagonal street inaugurates a change of plotting which on one side is at an acute angle and on the other at right angles, the side of the street to which the plotting is rectangular will present shorter crossings and better opportunities for buildings of average cost, and the greater traffic and the highest values will tend, other things being equal, to this side; when the angle at which the diagonal street cuts the general plot is obtuse, these effects are minimized. Rectangular plots are cheaper to build on and give greater accommodation for the expenditure incurred than those of irregular size, therefore when land is comparatively cheap, the tendency will be to build first on the plots which are easiest and cheapest to improve. At the same time it has been contended that when land becomes of greater value, a rectangular plotting has the disadvantage of too great a uniformity in building plots and offers no opportunities for special and monumental buildings, especially when, as in many American cities, the street plan disregards all variations in elevations.

In suburban sections, where the houses are detached, the width and direction of streets and the depth of lots has little influence on the planning of buildings, except that, in high class sections, where the lots are not of too great depth, the streets parallel and on either side of the best residential streets are apt to be used for stables and outhouses and are therefore of less value for residential purposes.

In office and shopping sections in strong demand, buildings frequently front on two streets, running through the block; thus Twenty-third street buildings in New York City extend to Twenty-fourth street on the north side and to Twenty-second street on the south side; Broadway buildings between Canal and Bleecker streets run through to Crosby street on the east side and to

Mercer street on the west side, the rear streets acting practically as service alleys for the delivery of goods to the Broadway buildings. The same is to be found in Brooklyn, where Fulton street buildings extend through to Livingston street. It may be noted that these buildings are practically all used for business purposes, being wholesale and retail stores. In cheaper business property, where deep stores are not in demand, the tendency is to use the interior portion of deep lots for inferior utilities, such as stables, garages, small factories, warehouses or cheap tenements.

In Paris, deep lots in residential sections are frequently utilized for the erection of what might be called front and rear apartment houses, these being divided by an inner court of good size, which, being laid out with shrubs and flowers, becomes desirable as an outlook for apartments. The apartments in the rear building are quieter and have cheaper rentals than those fronting on the street.



EXAMPLE OF UTILIZATION OF INTERIOR OF BLOCKS OF MORE THAN NORMAL DEPTH, BROOKLYN, N. Y.—In this case a garage, with entrance at A on Halsey Street, occupies shaded area.



If greater trouble were taken in this country to render interior courtyards pleasant and attractive, apartments fronting on them would command higher rentals; at present their only outlook is too often on bare walls and their neighbors' laundry.

The prevalent unit of depth of lots in New York City, which is one hundred feet, is largely responsible for the type of tenement house which receives its light and air from long narrow light wells, and which is built to a depth of about eighty to ninety feet. In most European cities the lots are very much shallower, and the average buildings seldom extend more than two or at most three rooms in depth.

COMPARATIVE VALUE OF CORNER AND INSIDE LOTS FOR  
DIFFERENT USES.

Streets at their intersection form corner lots which become more desirable as the land attains a scarcity value; they furnish permanent light and access on two sides, and when they are situated on traffic streets are of far greater value for shops and for other businesses needing frontage for display.

In cheap residential sections, corner lots are of little if any greater value than interior lots, and in detached sections the buildings are planned about the same as their neighbors. As land becomes scarce and rows of houses take the place of detached residences, the difference between corner and inside values increases, and where land is very valuable, a corner lot may be worth two or three times as much as an inside lot.

The tendency on land in good demand is to build higher and deeper on the corners than on the inside lots; thus, where the block front is improved with two-story houses, three or four stories will probably be suitable for the corners; where the inside houses are three or four stories in height, five or six stories will be normal at the

corners. In locations of high value, corner buildings can properly cover more ground than those on interior lots and furnish a far greater proportion of net accommodation to total size of plot. The tenement house laws of New York City allow ninety per cent. of the land on corner lots to be built over and only seventy per cent. of interior lots.

In general the point of highest value on a traffic street is at or near the center of the section through which it runs, and the strongest side will tend to be that which is backed up by the best residential neighborhood.

For department stores and similar utilities, which draw their trade from all parts of the city, long blocks are most suitable, as they give greater continuity of display; for local shopping streets, short blocks are best; the centers of long blocks being too far from cross streets, are generally weak and unsuitable for stores.

#### BLIND STREETS.

Streets which are not thoroughfares, sometimes called blind streets, are seldom in demand for the better classes of property, although they are free from noisy traffic. The lack of passenger traffic is naturally detrimental to shops, which depend for their success on the number of persons passing their show windows. They are generally used for the cheaper class residences or of tenements.

#### STREET AND SIDEWALK PAVING; WIDTH OF STREETS.

Good street paving and sidewalks are beneficial to all classes of property. Asphalted streets are now largely used, are easily cleaned and quiet, and though liable to attract much vehicular traffic, especially if neighboring streets are poorly paved, they are very beneficial to residential as well as to business streets. Badly paved, uneven cobble streets are greatly detrimental to residential

property, especially of good class, partly on account of the difficulty of access to all vehicles, partly because of the noise and of the accumulation of dirt, which is hard to remove. The same is true of sidewalks, which if broken, uneven and holding water in bad weather, are a nuisance and detrimental. One of the objections to city suburban property, or to the proximity of vacant lots to residential property, is the fact that in the winter snow is seldom removed from the sidewalks fronting the unbuilt on land, and the houses have to be reached over snow-covered paths.

Where there is much vehicular traffic, as in commission and warehouse sections, streets have hitherto been paved with granite blocks, which wear better than asphalt and afford a better footing for horses in bad weather, but the present tendency for horses to be replaced by power trucks will gradually result in the elimination of all but smooth street surfaces.

Good sidewalks are very necessary in shopping sections, where they facilitate access to show windows in which goods are displayed; the same is true in business sections, where constant communication is needed between the different office buildings and is chiefly along the sidewalks, though the traffic in congested office districts frequently overflows into the streets, especially when the sidewalks are very narrow, as in Nassau street, New York.

Mr. Charles Mulford Robinson, the well known writer on the improvement of American cities, called attention in his paper read at the London Town Planning Conference, held in October, 1910, to the futility and wastefulness of laying out, in suburban settlements especially, streets of standard widths, regardless of topography or of traffic requirements. He points out that streets in residential sections where the travel is very restricted

are frequently of uniform width, both as to roadway and sidewalk, with those which run through congested sections and are main arteries of travel.

Except in high class residential neighborhoods, where wide streets can be parked, and so rendered more attractive, streets should not be wider than called for by traffic requirements, otherwise they are wasteful, not only on account of the land taken up in this way, but by reason of the extra expense involved in grading, paving and maintaining them. Mr. Robinson further calls attention to the fact that it would in the end be far cheaper to widen, when the need became apparent, a few principal streets, than to provide uniform and too great widths to all of them, in anticipation of possible congestion of traffic in a few cases.

There are some instances where very wide streets have been reduced in width on account of the cost of making and maintaining them, thus in Macon, Georgia, where several streets were narrowed by deeding a strip on each side to the owners of abutting property.

The same effect as that produced by a wide street is sometimes obtained by setting the building line back from the lot line, thus giving additional width between the houses and sometimes later on wider sidewalks if required, as on Fifth avenue, New York.

Office sections and shopping property are not benefited by too wide streets, partly on account of the increased difficulty of crossing them through the heavy traffic which they attract and partly because it is impossible to see from one side of the street the shop windows on the other, thus diminishing somewhat the advertising value of their displays.

In some cities, where congested office or shopping sections have grown up in neighborhoods originally utilized for different purposes, or where the scale of business transactions has greatly increased, the streets may be-

come too narrow, not only for traffic requirements but for furnishing a sufficiency of light and air to the high buildings fronting on them; when restrictive legislation limits the height of the buildings proportionately to the streets on which they are situated, their possible accommodation may be reduced and the value of the land affected.

The narrowness of a street may be accentuated by its crookedness, as for instance, the lower end of Manhattan Island, where the canyons of the financial section are familiar to many.

Mr. Raymond Unwin, in "Town Planning in Practice," devotes considerable space in his chapter on "The Arrangement of Main Roads" to the width of roadway and sidewalks, provision for vehicular and street car traffic, intersections of streets, etc. He also deals most instructively with the size of building plots and the placing of buildings, mainly, however, in reference to the requirements of "Garden Cities" as they are being laid out in Europe, and especially in England.

#### NUISANCES.

A nuisance in real estate is a building or external condition which adversely affects any piece of property. A nuisance as regards one character of property may not be so with others; for instance, street car lines, which are a detriment to the better class of residences, benefit store property by facilitating access from the outlying neighborhood and from other sections.

High class residence property is most susceptible to the effect of nuisances against which it is frequently restricted. Nuisances in reference to such properties consist of street car lines or elevated roads, schools, apartment houses or tenements which encroach on light and air and tend to cheapen the neighborhood, saloons, noisy places of amusement, stables, factories or hospitals.

High class residential property maintains its value only so long as nuisances can be excluded; with their advent there is a tendency for the section to change character and for its occupants to move elsewhere.

The larger the section and the greater the number of buildings owned by their occupants, the stronger its ability to exclude nuisances of all kinds; non-resident owners will be liable to endeavor to increase their revenue at the expense of the character of the neighborhood.

The effect of nuisances on residence property diminishes as the character of the occupancy becomes cheaper. Noisy factories, breweries, stables, chemical works, slaughter houses, etc., are injurious to all classes of residential property.

Some manufacturing concerns which are not noisy or in other ways objectionable do not depreciate cheap residential property in their neighborhood, though the building immediately adjoining may be injured. Few men desire to live immediately across the street from their work; most of them try to reside in as good a neighborhood as their means will permit, provided it is within easy reach.

Office sections are injured by the presence of buildings of cheap character, such as stables, factories, tenements, etc.; as a general rule, however, property in a well established office section is of too high value to allow of its use for other purposes than for offices, banks, exchanges, etc.

Any building, especially if of objectionable character, causing a break in the continuity of the shops, would constitute a nuisance on a shopping street; a similar effect would be produced by vacant open spaces or a serious difference in the alignment of some of the build-

ings. The most favorable condition for a good shopping street is a continuous row of show windows, easy of access, easily seen, enabling the intending purchaser to rapidly inspect the goods for sale at the various shops.

#### LIST OF NUISANCES.

##### *Injurious to All Classes of Property—*

Factories.\*  
Stables.\*  
Hospitals.\*  
Chemical works.  
Gas plants.  
Abattoirs.

##### *Injurious to Good Residence Property—*

Elevated railroads.†  
Street car lines.†  
Tenements.  
Schools.  
Charitable institutions.  
Shops.  
Saloons.  
Dilapidated buildings.

The following extract from the New York "Sun," dated February 28th, 1911, shows an attempt to estimate in dollars and cents the detriment to a property caused by a nuisance—in this case the noise of machinery.

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\*Except to cheap residential sections; depending somewhat also on the character of the nuisance, thus a hospital standing in the midst of its own grounds is not as detrimental as where built up to the street line; a noisy iron factory is very detrimental as compared with a watch factory or one for the manufacture of mathematical instruments, employing a high class of well paid labor and not sufficiently noisy to disturb the neighborhood.

†Transportation facilities of more benefit to small shopping streets than injury by noise, and in case of elevated railroads, interference with light.

Daniel Rosendorf, who owns the apartment house at 125 East Eighty-third street and lives there, sued the New York Edison Company for an injunction restraining the company from running its power house, adjoining his property, because the machinery in the power house made so much racket that his family and his tenants couldn't sleep. Rosendorf also sued to recover for loss of rentals because of the noise.

Supreme Court Justice Erlanger, who tried the case, made three visits to the house to find out for himself how much noise the power house made. On two trips he went alone and inspected both the apartment house and the power house, and the third time he went with counsel on both sides and sat in Rosendorf's apartment while the Edison officials started up all their machinery to see how much noise they could make.

The court said that the resultant noise was such that the plaintiff will have an injunction unless the defendants find means within three months to deaden the sound from the operation of the machinery. Damages of \$687 were awarded for loss of rentals because of the noise.

#### RESTRICTIONS.

Residential property is frequently restricted against certain utilizations as well as in other ways; thus against stables, factories, saloons, etc.; which may not be allowed to be built there; also sometimes a uniform building line at a certain distance back of the property line may be established giving better light and air, and in suburban districts some space for gardens in front of the houses; also the character of the house and its cost within certain limits may be specified. Such restrictions are beneficial only when they apply to all the property on a street; great injury may be caused by one unrestricted plot in a street of otherwise carefully restricted residences.

In suburban property the minimum size of plots is frequently established and the utilization of the space between the building and the property line prescribed. Sometimes fences are not permitted; at other times



provision is made for parking along the sidewalks and for their maintenance by the owners of the whole block; some restrictions are for all time, others for a limited period.

The natural change of character of a section may be retarded by existing restrictions, which (when the character has changed) are sometimes declared void by the Courts on account of this interference.

The length of duration of a restriction is of great importance; thus a good residence street restricted to houses to cost not less than say \$10,000 each, limited to plots of fifty feet each in width, with a setback of the building line, say twenty feet from the property line, may, if the restriction expires before all the plots are improved, find the remaining vacant plots built up with apartment houses or shops, extending to the property line, thus pocketing some of the residences, cutting off the light of others, and eventually altering and destroying the character of the street.

The restriction of residential property against certain classes of buildings, for instance apartment houses, may add to its desirability for residential purposes, though at the same time it may detract from its commercial value, which would be greater on account of the increased earning power it would have if the erection of apartments were permitted.

This accounts for the great difference in value which sometimes exists in residential neighborhoods between restricted and unrestricted plots; when the plots adjoin, this discrepancy will be greatest, as the restricted plot will be injured by its neighbor on which an apartment house can be erected.

#### TAXATION AND ITS EFFECT ON VALUES.

Tax assessments frequently fail to adjust themselves with sufficient rapidity to the changes of value taking



INTENSIVE USE OF LAND IN A SECTION OF PRIVATE RESIDENCES, EAST 19TH STREET, BROOKLYN, N. Y.—  
This apartment house, which is rendered desirable by the adjoining detached dwellings, detracts greatly from their value. An unrestricted lot so situated in a restricted neighborhood can earn a good return on a far greater value than that of the restricted plots.

place in growing cities. In some of these, assessments remain the same for years and are only readjusted in those instances where buildings are reconstructed or new ones erected; the result is that some sections are over and others under taxed; the individual owners suffer in the first case and in the latter the community suffers by the failure of the assessed property to bear its fair share of taxation.

When, on account of changed conditions, sections suffer a great reduction in values, such as occurred for instance on the northerly end of Fulton street in Brooklyn at the time of the erection of the Brooklyn Bridge, the taxes may remain so high that they absorb entirely the net return from the property, resulting in its practical confiscation.

The expense of opening streets through cheap property, of laying sewers and providing other municipal improvements before a section is ripe for them, frequently causes a severe depreciation in values, and sometimes results, when the cost of the improvements is equal to or in excess of the value of the land taxed for them, in the owners abandoning their property rather than pay the taxes assessed.

The fear of excessive taxation of this nature is one reason why the inhabitants of suburbs are frequently so averse to allowing their communities to be included within the corporate limits of the city of which they naturally form part, the benefits to be derived from their admittance being often more than offset by the added taxes which they have to meet.

#### LEGISLATIVE OR MUNICIPAL ACTION.

Real property will be found most desirable for investment in those states where the laws are such as to facilitate the ownership and speedy transfer of property, overcoming as much as possible the objection to its being

a "slow asset," and where the foreclosure of mortgages is expeditious and cheap, resulting in low rates for loans. Building and tenement house regulations which are not unduly oppressive and lien laws which are fair are beneficial, the converse also being true.

Municipalities also establish fire limits and define the character of buildings which can be erected in certain sections; these, if not in advance of requirements or unnecessarily harsh are mostly beneficial. There was considerable agitation in Boston some years ago because the tenement house regulations, which forced all tenement houses over three stories in height to be of fire-proof construction was driving this class of structure to the outlying suburbs, where these regulations did not apply.

The power of granting licenses for saloons, markets, etc., and franchises for street car lines, ferries, etc., is one which should be exercised with good judgment; for instance, the granting of a saloon license in a high class residential neighborhood would be most detrimental to property.

Sections provided with a proper supply of water, gas and electric light and a proper sewage system (all of which are becoming more and more functions of municipal administration) are benefited at the expense of those without these advantages. Municipal activities well performed, such as street lighting and cleaning, garbage removal, adequate police protection, are also beneficial factors.

It would be preferable if in thickly populated residential and business sections, the cleaning of streets, removal of ashes and garbage and delivery of coal to the larger buildings were done at night, or at any rate not during the busy hours; the loading of ashes and garbage into carts, generally open, in the day time, especially on windy days, is not only objectionable, but unhealthy.

Some sections, such as those used for warehousing and wholesale business, are benefited by permission to back wagons on to the sidewalks in order to unload their contents into the buildings themselves, thus saving handling; though this is detrimental to foot traffic on these streets.

Property values are affected by the buildings erected by cities, either for their own use, such as police stations, jails, court houses, etc., or for more general uses, such as markets, public baths, schools and public docks and warehouses; also by the control over the opening of new streets, the building of bridges, and in some cities by the ownership and operation of street or underground railways, ferries, etc.

#### INFLUENCE OF BUILDINGS ON LOCATION AND VICE VERSA.

The influence exerted on buildings by their surroundings is generally far greater than the influence of any one building on adjacent properties. There are, however, some exceptions. Thus the removal, which was contemplated some years ago, of the New York Stock Exchange from its present location to Union Sq., would have largely affected the whole financial section, carrying with it banks, office buildings and all those whose business required proximity to the Exchange.

Railroad terminals influence their surroundings to a great extent, attracting hotels, stores, express offices, etc., to their vicinity. The larger the city the smaller will be the influence of any one building on its surroundings on account of the numerous other factors on which the character of the various sections is dependent.

#### INTERFERENCE WITH NATURAL TENDENCIES BY ARTIFICIAL MEANS.

With some exceptions, it will generally be found that the character of a section will sooner or later greatly

influence any building which may be erected or may stand in it. The attempt sometimes made to dominate a section by erecting a building of different character than the demands of the section justify generally results disastrously. A section, for instance, devoted to small business cannot be forced to alter its character by the erection in its midst of a large office building. Neither can a few good residences alter the character of a cheaper residential section in which they may be built. There are instances of changes of character of sections having been brought about by artificial means, but they are nearly always the result of building on a large scale and of correctly anticipating future normal tendencies.

Natural conditions and tendencies are sometimes influenced by artificial means, as when permanent endowments, requiring the use of buildings for given purposes, sentiment or other reasons, will sometimes cause a misplaced building or one in a section of altered character to continue in use for its original purposes, for which it may be, through altered conditions, entirely unfitted. Thus, Trinity Church in New York City is in the heart of the financial district, far from the residences of its communicants; yet services are held there every Sunday.

SUMMARY OF EXTERNAL FACTORS BENEFICIAL OR DETRIMENTAL TO DIFFERENT CLASSES OF BUILDINGS AND COMPARATIVE VALUE OF CORNER AND INSIDE LOTS

The beneficial or detrimental effect of surroundings or external conditions on different classes of buildings can be summarized as follows:

HIGH CLASS RESIDENCES.

Corners are of considerably greater value than interior lots on account of better light, better access, less

waste in planning and greater net accommodation in proportion to size of lot.

*Beneficial.*

Property greatly benefited by being generally regarded as "fashionable."  
 Similarity of surrounding buildings, absence of nuisances.  
 Site of moderate elevation.  
 Good outlook, facing park or open squares.  
 Accessibility to theatres, clubs, churches, etc.  
 Reasonable accessibility to means of transportation.  
 Good approach to section.  
 Well paved streets, good sidewalks.  
 Sufficient size of section to resist encroachments.

*Detrimental.*

Nuisances, such as elevated railroads, street car lines, noisy traffic.  
 Factories, tenements, cheaper apartments, public or private schools, hospitals, charitable institutions.  
 Shops, saloons.  
 Low lying land.  
 Poor approach to section.  
 Small size of section, making it difficult to resist encroachment of undesirable features.  
 Poorly paved streets and poor sidewalks.

MIDDLE CLASS RESIDENCES AND APARTMENTS.

Corner lots are somewhat more valuable than interior lots; proportion increases rapidly with increased demand. Subject to same influences as high class sections, but to a lesser extent; the presence of schools in the vicinity, detrimental only to property within hearing; also should be within easy reach of means of transportation and accessible to good shops.

HIGH CLASS APARTMENT HOUSES AND APARTMENT HOTELS.

Corner lots of far greater value than interior lots, large plots more valuable in proportion to small plots. Subject to same influences as high class residence sections, but to a lesser degree; generally erected as near as possible to high class private residential sections.

## APARTMENTS AND FLATS.

Corners of greater value than interior lots, proportion increasing rapidly with increased demand.

*Beneficial.*

Good transportation facilities.  
 Immediate good surroundings.  
 Proximity to parks and public gardens.  
 Good approach.  
 Good schools in vicinity.  
 Absence of nuisances.  
 Proximity of theatres, clubs, churches, etc.  
 Good paving, sidewalks and clean streets.

*Detrimental.*

Poor transportation.  
 Poor surroundings.  
 Poor approach.  
 Nuisances, such as factories, stables, elevated railroads.

## CHEAP RESIDENCES AND TENEMENTS.

When built up of small houses, corners of little excess value over interior lots; in some cases, same value, owing to extra cost of street improvements. In congested sections, where tenement houses are in demand, corners worth considerably more than inside lots, on account of greater net accommodation, better light and availability of ground floor space for stores; corner values increase rapidly in proportion as land becomes in greater demand.

*Beneficial.*

Good transportation facilities.  
 Proximity to parks and open spaces.  
 Schools.  
 Absence of nuisances.  
 Good paving, sidewalks and clean streets.

*Detrimental.*

Poor transportation.  
 Absence of school facilities.  
 Too close proximity to noisy factories, chemical works, gas plants, abattoirs, cemeteries.  
 Poor streets and sidewalks.

## FINANCIAL AND OFFICE BUILDINGS.

Very great excess in value of corner over interior lots, on account of permanent light, increased available



accommodation, larger frontage for advertising and greater accessibility.

*Beneficial.*

Similar surroundings.  
Ease of access from other sections of the city.  
Accessibility to principal financial institutions, banks, exchanges, clearing houses, etc.  
Compactness.  
Ease of intercommunication.  
Absence of severe grades.

*Detrimental.*

Poor or dissimilar surroundings.  
Difficult access from other sections.  
Distance from main financial institutions.  
Noise of elevated railroads.  
Noisy or unpleasant factories or plants.

HIGH CLASS GENERAL RETAIL SHOPS AND DEPARTMENT STORES.

Great excess value of corner over interior lots, especially at the intersection of two or more traffic streets, mainly on account of the increased opportunities for display and the intensity of passenger traffic on these streets; partly on account of better light; they attract loft buildings for light manufacturing or for finishing processes, which locate as near them as possible.

*Beneficial.*

Good frontage on traffic streets for display.  
Good transportation facilities.  
Continuity of display windows of other shops.  
Nearness to the best residence sections.  
Good streets and sidewalks.  
Absence of severe grades.  
Good access from residential sections.  
Sufficient area for proper showing of goods.  
A rear or side street for the delivery of goods. (In some cases, especially department stores.)

*Detrimental.*

Frontage on non-traffic streets and too small area for proper display of goods.  
Poor transportation facilities.  
Nuisances, such as irregular building line, schools, vacant unimproved lots, factories, stables.  
Lack of continuity of shop fronts.  
Poor access from residential sections.

## SMALL LOCAL RETAIL SHOPS.

Corners more valuable than interior lots, on account of increased opportunities for display and light; proportion depends largely on value of traffic on intersecting streets.

*Beneficial.*

Proximity to customers, who generally are those residing in vicinity.  
 Car line on street.  
 Good frontage for display more important than large area.  
 Maximum depth necessary, about fifty or sixty feet.  
 Continuity of shops, but not too long blocks; if blocks are too long they are weak at center and receive a smaller proportion of passenger traffic for a given frontage.  
 Good paving and sidewalks and clean streets.

*Detrimental.*

Inaccessibility to customers.  
 Frontage on non-traffic streets.  
 Lack of continuity.  
 Too long blocks, too long street crossings at corners.  
 Poor transportation facilities.  
 Bad paving and sidewalks and dirty streets.  
 Nuisances, such as factories, stables, etc.

The best local shopping street is generally found to lie as nearly as possible through the center of the district which it serves; its strongest part will tend to be near the center of gravity of the section.

## WHOLESALE OR COMMISSION BUILDINGS.

Corner lots do not greatly exceed interior lots in value. Sufficient floor area for displaying and storing goods more important than frontage. Goods generally advertised to a greater extent by commercial travelers than by street display.

*Beneficial.*

Sufficient area for storage and display of goods.  
 Ease of access.  
 Light (in some cases).  
 Proximity to high class retail stores when custom is with them.  
 Proximity to freight transportation facilities.  
 Location amidst similar utilities.  
 Good and level streets for hauling.

*Detrimental.*

Lack of sufficient area for display and offering of goods.  
 Distance from transportation facilities.  
 Poor street improvements and heavy grades, increasing cost of hauling.

## WAREHOUSES.

Corners of practically same value as interior lots, except where light is needed for inspection of goods. Frontage on street of small importance compared to required area. Deep lots give cheaper rentals.

*Beneficial.*

Nearness to steamship or railroad facilities.  
 Level and well paved streets for hauling.

*Detrimental.*

Lack of transportation facilities.  
 Shallow lots.  
 Difficult access, heavy grades and poorly paved streets.

## FACTORIES.

Corners of same value as inside lots, except for light. Land of cheap value and nearness to transportation facilities chief requisites. For light manufacturing, proximity to large retail stores which they serve.

## SEMI-PUBLIC AND PUBLIC BUILDINGS.

These do not form sections, but are distributed amongst the different quarters of a city, sometimes as with post offices, court houses, etc., owing their location to political considerations.

Railroad stations or terminals penetrate as far as possible towards the center of cities, the location of their passenger and freight departments being governed by

the necessities of distribution. They are dependent on topography, heavy grades being impossible for railway lines.

Churches, public libraries, clubs, theatres, concert halls, schools and museums are located with reference to the residence of the people whom they serve. All of the above, except perhaps theatres and concert halls, should preferably not be erected on a busy traffic street; they interfere with the continuity of stores and at the same time the noise and traffic of such streets is detrimental to them.

Theatres, concert halls and similar buildings require greater publicity and good transportation facilities; they are benefited by being on busy traffic streets, or at any rate readily accessible from them; they attract, restaurants, cafes, confectioners, etc., which frequently locate in the ground floor of the buildings they occupy. Museums, picture galleries, central public libraries and buildings for general public uses should be erected in central sections with good transportation accessible from all parts of the city; being frequently of monumental character, they are best placed in parks or open spaces where they can be seen and reached from all sides and are less exposed to the hazard of conflagration.

Local public buildings such as public bath houses, police stations, engine houses, etc., should be within easy reach of those they are intended to benefit. They are not investment properties and are little, if any, affected by their surroundings. Public markets should be as near as possible to transportation facilities and to their customers. They influence greatly their surroundings and attract commission houses and similar utilities.

Post offices should be centrally located, easy of access to those who use them, and in large cities they generally have numerous branches, both for the receipt and distribution of mail and other matter. They are not affected by their surroundings.

## CHAPTER VII.

### THE STRUCTURAL PROBLEM, OR UTILITARIAN REQUIREMENTS OF BUILDINGS.

Theoretical requirements—Buildings should be in harmony with their surroundings—Buildings proportionate in cost to value of land—Law of increasing and diminishing return—General requirements—Utility—Planning—Access—Light and air—Disposition of accommodation or floor plan—Maximum of available accommodation—Economy of service—Construction—Probable commercial life—Cost—Character and use—Fire hazard—Building laws—Maintenance—Decoration.

**N**EXT in order, after consideration of the effect produced on buildings by their surroundings and external conditions, comes the study of the structure itself and of the various elements which contribute to its efficiency and commercial success.

There are two principal theoretical requirements applicable to buildings; they are: first, that they shall be in harmony with their surroundings; second, that their cost shall bear a proper proportion to the value of the land built on.

#### BUILDINGS SHOULD BE IN HARMONY WITH THEIR SURROUNDINGS.

The tendency which exists for cities to become segregated into different sections based on different utilizations has been pointed out.

The buildings composing each of these sections may be divided into two distinct types: first, the main type

which expresses the character and life of the section; thus, a residence in a residential section, an office building in an office section; second, the attendant type, of which the following would be examples: churches, clubs, schools, libraries, in residential sections; bank buildings, exchanges, clearing houses, in an office section.

Shops, which follow after and press on residential sections, or in the cheaper neighborhoods form distinct shopping streets in their midst, are in this respect attendant buildings, though in shopping centers they become the main type.

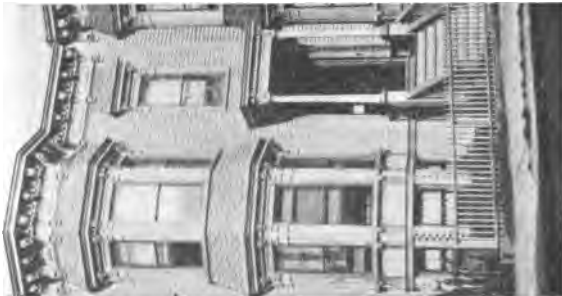
Bearing in mind that all sections are not distinct in character and that the cheaper residential and business sections are apt to be devoted to various utilizations, the main type and the proper attendant buildings are more or less readily recognized, and any decided variation results in a building which is not normal to the section and is out of harmony with its surroundings. Thus, a factory, an office building, or a tenement in a good residential section would be out of place and out of harmony. Too great a departure from the prevailing type would also indicate buildings which are abnormal; for instance, a mansion in the midst of small cottages, or a cheap cottage amongst large houses.

In sections of changing character, the first buildings showing a departure from the prevailing type will appear to be out of place; but if they represent a correct interpretation of the trend of the neighborhood they will eventually become the suitable type, and the older buildings obsolete.

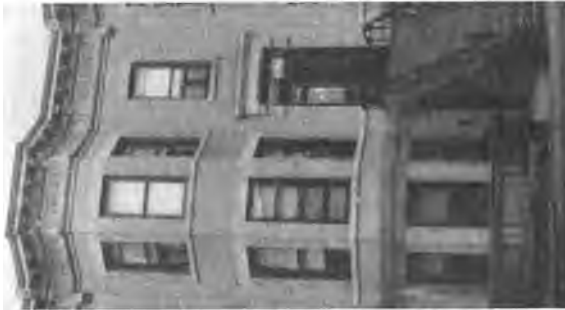
#### BUILDINGS PROPORTIONATE IN COST TO VALUE OF LAND.

The necessity for a proper proportion being maintained between the cost of buildings and the value of the land covered is not at first sight as evident as that of their suitability to location; and the desire of earning the





BUILT IN 1895.  
Frame 2 family house, cost,  
\$3,000.  
On land costing \$700.  
Land 40% covered.  
Unit of width, 20 feet.



BUILT IN 1900.  
Brick 2 family house; cost,  
\$5,500.  
On land costing \$1,000.  
Land 50% covered.  
Unit of width, 20 feet.



BUILT IN 1906.  
6 family house; cost, \$12,500.  
On land costing \$2,500.  
Land 70% covered.  
Unit of width, 26 ft. 2 ins.



BUILT UNDER THE 1901 TENEMENT HOUSE LAW.  
BUILT IN 1911  
16 family house; cost, \$32,000.  
On land costing \$8,000.  
Land 70% covered, except corners 80%.  
Unit of width, 54 feet.

DIAGRAM AND PHOTOGRAPHS SHOWING HOW, IN THE LAST 17 YEARS, ON AN ACTUAL BLOCK, THE RELATION OF THE COST AND SIZE OF BUILDINGS AND THE PROPORTION OF LAND COVERED, HAS VARIED WITH THE DEMAND FOR THE LAND AS EVIDENCED BY ITS VALUE. BUILDINGS NOW IN EXISTENCE, BROOKLYN, N. Y.



greatest possible return from a given piece of land frequently results in its being overbuilt.

In a general way persons familiar with real estate operations recognize the necessity of some such proportion, and buildings too costly for their sites are referred to as being "top heavy."

This requirement results from the fact that the value of land is merely the expression of the strength of demand for its use and that when the demand increases, and with it the cost of the land, it is necessary to build higher in order to secure a larger amount of accommodation, thus lessening the rent per unit of accommodation, which will be chargeable to the land. This will be understood better by dividing the rent into two parts, one which can be considered as ground rent, the other representing the return from the money invested in the building.

If land is cheap and plentiful, buildings of one or two stories will be the rule; as land becomes in greater demand, the same ground rent will command a lesser amount of it and buildings will increase in height; the man who would not live above the second story if he followed his inclinations, may have to climb four or five flights of stairs in order to secure accommodation within his means in the location which he prefers.

The erection of buildings over two, or at the most three stories in height, when land is plentiful and cheap, is therefore an economic error; the upper stories are less desirable on account of the added effort needed to reach them and better results would be obtained and the same accommodation provided by using more land and erecting lower buildings. It is only when increased demand causes an increase in the value of land that the erection of a greater number of stories is desirable. This is exemplified in the buildings of which villages are com-

posed and which are rarely higher than two stories; as these villages grow into towns, the principal streets may require buildings of from four to five stories; but it is only when land is in great demand that they are erected above six stories in height.

Moreover, when the proportion of the cost of a building is in excess of four or five times the value of the land, it has already been explained (on page 55, "Investments of Diminishing Value") that the depreciation in the building is apt to be in excess of the natural increase in the value of the land, with the consequence that the value of the property is constantly decreasing.

Buildings may be too costly for their sites, by reason of the use of too costly materials or forms of construction, raising the cost of accommodation above the average. Frequent comment is heard, especially after a severe conflagration, on the reluctance of investors to erect fireproof buildings, notwithstanding the tremendous aggregate fire loss, especially in this country. If buildings could be erected of fireproof materials as cheaply as they are of inflammable construction, fireproof construction would be almost universally used; but in most classes of buildings, the average man will not pay any more rent for a fireproof than for a non-fireproof building, therefore the investor erecting a building of more costly materials in order to avoid loss by fire, will not get as good a return as his neighbor, who builds of ordinary materials and supplies accommodation equally good in all other respects. This, of course, does not apply to buildings on land of high value for tenants who can afford and are willing to pay higher rentals for the extra cost of fire protection.

Self interest is the prime mover in building as in other investments, and the only reasons which will in-

duce people to erect buildings with fireproof or fire-resisting instead of inflammable materials will be either that the cost be no greater or very little more, or that the difference in cost be equalized by insurance rates, which it is not at present, or by a saving in accommodation sufficient to pay interest on the extra cost, or again if compelled to do so by municipal regulations, which is the case in most cities with certain classes of buildings.

In New York City for instance, tenement or apartment buildings over six stories in height must be built of fireproof material throughout; or when they accommodate more than two families to each floor, the stairs and the walls which enclose them are required to be of fireproof materials. In office buildings over a certain height the use of wood, unless specially treated, is prohibited.

The compulsory use of more expensive materials naturally results in increased rentals and it is questionable whether city authorities will ever reach the point of insisting on the use of fireproof materials for all classes of buildings within a city's limits.

#### LAW OF INCREASING AND DIMINISHING RETURN.

That a proper proportion should exist between the cost of a building and the value of the land on which it stands is recognized in economics; and the "law of increasing and diminishing return," which applies to all industries as well as to agricultural or urban land, calls attention to the tendency for increased amounts of capital applied on a given amount of land to furnish an increased return up to a certain point, after which there is a diminishing return from additional capital invested. (Principles of Economics, by Alfred Marshall, Book V., Chapter VIII.)

There is always a limit at which the investment of capital in buildings will return the maximum net income; after this has been reached, any further expenditure will result in a smaller percentage of return on the investment, either from diminished rentals for the extra accommodation, greater expenses of building higher, or loss of space for stairs, hallways, elevators, etc.

It has been stated that in practice the best possible results on land of high value are obtained when the cost of the land and buildings are about equal. As land becomes of a cheaper class the proportionate cost of the building increases, until on land of the cheapest grade mechanics' houses or tenement dwellings can properly cost four or even five times the value of the land. (See R. M. Hurd's "Principles of City Land Values.")

#### GENERAL REQUIREMENTS.

Next in order after the theoretical requirements, there are three principal factors to be considered in building. They are in the order of their respective importance: utility, construction, decoration.

In putting utility in the place of first importance and construction second, it is presumed that the building is of sufficiently sound construction to enable it to properly fulfill its function of sheltering those who use it for residential or business purposes. The proper construction of buildings is provided for and safeguarded by the building laws which are in force in all cities of any size, and the element of safety can therefore be dismissed.

#### UTILITY.

Buildings from the standpoint of this study represent the investment of capital for the sake of profit. This profit may be either in the nature of a money rent or a return in use and occupation,

Utility and profit go hand in hand; the building which is most useful is nearly always the most profitable; no matter how artistic in appearance, however much it satisfies the eye, though it be of the most substantial and durable construction, if it is not suitable to the uses to which it is to be put, it entails a loss of expenditure and a sacrifice of convenience.

Gwilt relates that Horace Walpole told a certain nobleman who had boasted of the beauty of the facade of his house, which within was exceedingly ill contrived, that he thought the peer would do well to take the house opposite, that he might thus be always able to look at it.

No truer axiom can be formulated for the guidance of architects and others engaged in building, than the following from Gwilt's "General Principles of Composition":

"All ornament in architecture is non-essential, inasmuch as the pleasure received by the eye is not its end. To public and private utility, the welfare and comfort of individuals, which are the ends of the art, every other point must be sacrificed, and it is only when these have been accomplished that we are to think of decoration."

It is said of Sir John Vanbrugh that "he seems to have regarded his buildings as so much material for scenic effect, at the sacrifice of all suitability for their purpose;" also of his Castle Howard that "it contained lengthy corridors and hardly one fine room." Vanbrugh in this building considered the demands of decoration of more importance than those of utility and would appear to have overlooked the fact that much more discomfort is caused by a badly planned building than by one of inartistic appearance.

The dictum that "form should follow function" is merely another way of emphasizing the importance of utility.

The proper solution of the problem involved in the study of any proposed building, necessitates an inquiry into the manner of securing from it the greatest efficiency and adaptability to its utilitarian requirements, which being decided with a due regard to constructive demands, necessary readjustments and allowances can be made to accommodate the purely architectural or decorative features, always without undue sacrifice of utility.

The importance of utilitarian requirements is greatest in buildings erected for purely commercial purposes; in these it should supersede all others, excepting only the requirements of safe and sanitary construction. In buildings erected for the satisfaction of personal desires, such as residences for private occupancy, or in those structures which, besides their practical use, serve to express the dignity and wealth of the communities by whom they are erected, the requirements of utility diminish somewhat in importance and they are least evident in buildings of a purely monumental character.

When applied to buildings, utility in its broader interpretation differs from commercial utility in that the former means that a building should be adapted to the purposes for which it is intended, whatever these purposes; the latter, not only that a building be adapted to its proposed use, but also that the proposed use be such that public opinion regard it as legitimate and desirable.

A man may erect a building for his own use as a residence; it may suit him in every way and thereby fulfill all the requirements of utility from his point of view, but if the majority of the other members of the community consider it undesirable and unsuitable to their uses, the building will lack commercial utility, and if the original owner desires to dispose of it, he will do

so at a loss which will be in proportion to the variance of his ideas from those of other possible users of the building.

The requirements of commercial utility can therefore be said to be those called for in the opinion of the majority of probable users; they vary somewhat with the changes of public opinion and are governed to some extent by fashion and customs; the fundamental principles, however, remaining the same.

Land and buildings are transferable, can be conveyed from one owner to another; it is seldom that a building, even a private dwelling, is used during the term of its existence only by the person or persons for whom it was constructed; hence the desirability of not departing too much from the accepted standard of usefulness, for if this is done, the sale of the property is almost certain to be accompanied by a partial or total loss.

Buildings of a public and in some cases of a semi-public character, being the property of the community at large or of a number of the members of the community, are not looked upon as transferable wealth to the same extent as business or residence buildings, hence the need of attention to purely commercial requirements is of less importance.

WHAT, THEN, ARE THE ELEMENTS WHICH CONSTITUTE  
THE UTILITARIAN REQUIREMENTS NECESSARY TO  
THE COMMERCIAL SUCCESS OF A BUILDING?—  
PLANNING.

They may all be included under the head of planning, and it has been stated that "planning is a compromise of conflicting requirements." The most successful planning, therefore, is that which sacrifices the requirements of lesser importance in favor of those more important.

In the Architectural Record of July, 1893, in an article by Mr. George Hill entitled "Some Practical

Limiting Conditions in the Design of the Modern Office Building," we find the following: "The elements that must be combined in the successful building are:

- (a) Ease of access.
- (b) Good light.
- (c) Good service.
- (d) Pleasing environment and approaches.
- (e) The maximum of rentable area consistent with true economy.
- (f) Ease of rearrangement to suit tenants.
- (g) Minimum of cost consistent with true economy."

Leaving out the external elements which have already been classified, the following requirements will, with some exceptions, apply to all buildings and they are given in the order of the relative importance which prevails most frequently.

1. Access.
2. Light and air.
3. Disposition of accommodation or floor plan.
4. Maximum of available accommodation.
5. Economy of service.

The relative importance to be given to these different requirements may vary somewhat with the uses of the buildings and this will be discussed later under the head of special requirements; thus, in a building used for storage of certain classes of goods, though ventilation may be important, light may not be so, and may even in some cases, be injurious.

#### ACCESS.—ENTRANCES, HALLS AND CORRIDORS.

The entrance, which is the connecting link between the exterior and the interior, is in most buildings of great importance.

When the impression conveyed is favorable, a proposed tenant enters the building in a satisfied frame of mind



and is disposed to overlook minor defects; the effect of a poor entrance is to prepare him to look unfavorably on the rest of the building.

The greatest ease of access should be provided, not only to the building itself, by means of its entrance or entrances, but to the different portions of the building, through the necessary halls, corridors, stairways, elevators, etc.

No entrance should be placed in a recess or angle where it is not readily seen on approaching the building; it should be plainly visible, properly proportioned to the size of the building, to the number of users and to the mode of use; a theatre or public assembly room, the entrance to which would be used at the same time by great numbers of people, should have more space apportioned to it than in a building of the same size but where the traffic is intermittent; for instance, an apartment house.

Entrances of secondary importance should be properly subordinated to those for principal use and as much as possible their purpose should be evident.

Impediments to free entry and egress, especially in buildings used by great numbers of people, should be avoided as much as possible; such are numerous steps (especially when exposed to the weather), interfering columns, piers and obstructions of all kinds. Insufficient size would also constitute an impediment.

The Architectural Review in its issue dated March, 1901, calls attention to the inadequacy in many buildings of the entrances, both in respect of their size and of their impressiveness.

The necessity for the doorway to a building in constant use to be as free as possible is recognized by Ruskin in "Stones of Venice," Chapter XVI., under the head of "Form of Aperture," and he gives it as the

reason for the splaying of the jambs of the entrances to medieval churches and public buildings.

Entrances below the street level are undesirable, as they become receptacles for the dirt and dust of the street; at least one step above the sidewalk should be provided, except in some buildings where the entrance is treated as a continuation of the sidewalk and is sometimes on the same level; thus in the case of many arcades the main passage is a public thoroughfare.

In corner buildings of average size a central entrance on the longest front generally leads to a better interior plan; the same is frequently the case in interior buildings with a facade of sufficient width.

Dark, crooked and poorly lighted halls should be avoided, the halls and corridors in buildings containing numerous rooms should be so arranged as to enable them to be reached with the minimum of trouble; where the main dependence is on stairways, they should be of ample size, of easy grades, and free from numerous turns and narrow winders. Where elevators are used they should be placed so that they are readily seen from the public entrance and properly located with reference to the different parts of the building.

#### LIGHT AND AIR.

There is no excuse for the lack of proper provision of light and air in buildings erected on cheap land, but where land becomes of high value there is always a tendency to utilize it to the fullest extent, sacrificing necessary light and air for the sake of additional accommodation.

The most flagrant examples of buildings insufficiently lighted and with improper provision of fresh air to the occupants are to be found amongst the tenement houses erected in New York City before the introduction of the

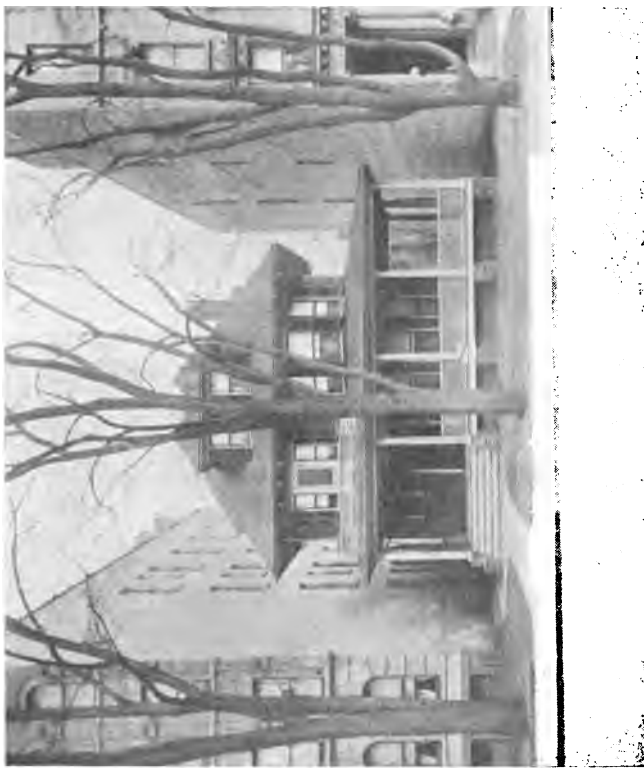
present tenement house laws, which enforce a proper allowance of both in all new buildings to be used as dwellings for more than two families, and which restrict the proportion of the lot which can be covered and insist on the provision of outside light and air to all rooms.

In congested office districts, high buildings have been erected which are quite insufficiently provided with both light and air, the latter being stagnant at the foot of the deep light wells and the former requiring to be supplemented by artificial light, the constant use of which is injurious to the eyesight and health of those who are obliged to depend on it.

The remedy for these conditions is found in the rentable value of light and air. Those buildings whose rooms are light and well ventilated can command better rents and hold their tenants better than buildings with dark and unventilated rooms or offices.

All rooms used for living or sleeping purposes, or for any continuous occupation, should have direct access to outside air; the indirect provision of light and air through other rooms to living or sleeping rooms is unhealthy and should be forbidden by law. Unfortunately, in certain classes of dwellings in New York, especially two-family houses and in buildings where the ground floor is used for stores and not more than two families reside on the upper floors, indirect lighting is permitted and has resulted in the erection of thousands of dwellings containing a large percentage of rooms where healthy conditions are only to be obtained at the sacrifice of privacy.

In buildings where the greatest possible amount of light and air is required, it is a mistake to obscure the windows by setting them in deep recesses, or to cut off the light by heavy projections, such as overhanging cornices, belt courses and balconies and other obstructions.



- (1) A POKETED BUILDING, OCEAN AVE., BROOKLYN, N. Y. The commercial value of this residence is practically destroyed by the apartment buildings built forward of it, cutting off its light and rendering it undesirable for a private residence.
- (2) A POKETED BUILDING, ATLANTIC AVE., BROOKLYN, N. Y. Its main value is as a background for large signs which can easily be seen from the street.

Decorative features should be used in such a manner as not to detract from the commercial value of the building.

In making provision for light courts it should be remembered that one large court will furnish far better light than several smaller ones containing the same superficial area. The size of light courts should also be governed by the height of the building; an adequate court for a three-story building would be entirely inadequate if the building were ten stories in height. Light courts should be faced with light colored brick or at any rate painted a light color, which helps very materially in lighting rooms facing them.

In cities where there is no established building line, and especially in sections which are changing character and where buildings differing from the existing type are being erected, it frequently happens that a building will be "pocketed" by having others project in front of it on both sides, or it may be "blanketed" when the projection is on one side only.

The injury to light and air as well as to the appearance of the building depend largely on the amount of the projection and the uses to which the building is put; thus a detached dwelling of good class, deeply pocketed by two apartment houses, would be seriously affected and its commercial value in extreme cases entirely destroyed; a tenement under similar conditions would be injured, but less seriously.

#### DISPOSITION OF ACCOMMODATION, OR FLOOR PLAN.

The arrangement of the main units of accommodation together with the means of communication between them, the provision of the necessary halls, stairways, elevators and service rooms, and in the larger buildings of the space needed for the installation of machinery, boilers, sanitary appliances, etc., constitutes the planning proper or the layout of the building.

In good planning it is most important to preserve a proper relation between the different units, ascertaining their relative value, and where compromises are necessary sacrificing secondary accommodation to that which is more important. Thus, in an office building, certain offices are more valuable than others, having better advantages of light, proximity to elevators, or frontage on main streets (with its advertising possibilities); these should not be sacrificed in favor of offices of inferior renting value. Similarly the ground floor space in a financial building bringing a far greater rental than any other accommodation, the plans should provide for the fullest possible use of this space and it should not be subordinated to cheaper portions of the building.

In dwellings, accommodation of minor importance, should yield to that more important and the principal reception or living rooms for instance, should not be sacrificed to those for inferior uses.

Easy communication should be provided for the servants' quarters to those portions of the house where their presence is most needed; at the same time they should be duly separated from the rooms occupied by the family, the importance of this requirement increasing, greatly in houses of higher class. Ease of communication between the different parts is most important. Most modern houses of any size are supplied with elevators, which should not, however, prevent the provision of stairs of easy grade, the size and elaborateness of which depend on their prominence and on their surroundings. Every house, where proper separation between the family and the service quarters is required, should be provided with a back stairway, enabling the servants to reach their own quarters without going through the main part of the house.

No room should be the only means of access to other

rooms; bedrooms more especially should not be used for this purpose.

Halls and corridors should be proportioned to the size, number and importance of the rooms which they serve; they should be as direct as possible and should communicate with the outer air for the purpose of light and ventilation.

Loss of available accommodation may result from disconnected or straggly planning, lack of subordination of inferior accommodation and means of communication to the principal parts, dark and unventilated rooms, unnecessary dark corners and lack of directness. Simplicity in planning is the best preventive of waste of accommodation.

#### MAXIMUM OF AVAILABLE ACCOMMODATION.

This consideration is of great importance, especially in purely investment buildings; by available accommodation is meant that which is useful and serviceable. Thus, 1,000 square feet of well-lighted, properly arranged accommodation will generally rent for more than fifteen hundred square feet of poorly lighted space, when the arrangement is otherwise equally good and the locations similar.

In endeavoring to avoid loss of accommodation, frequently under compulsion by shortsighted clients, architects are apt to injure an entire building in order to gain a few feet of extra space, which, when provided, is valueless.

The maximum of available accommodation is provided by judicious planning; by the avoidance of rooms badly proportioned, so large as to be imperfectly lighted or so small as to be inconvenient, of halls and passages out of proportion with the rooms or apartments they serve, and by a due observance of the relative import-

ance of the different units of accommodation; in other words, by a proper economy in planning and arrangement.

#### ECONOMY OF SERVICE.

Economy of service is especially important in high class office buildings, transient and residential hotels, and residences or other buildings where the cost of service and maintenance is a large proportion of the rentals.

Great care should be paid in such buildings to the disposition and arrangement of the mechanical plant. The proper concentration of all mechanical appliances reduces the number of men required for their operation; with elevators of sufficient speed, a lesser number can be used. Especially in high class hotels and apartment houses, all serviceable labor-saving devices and means for reducing the number of domestics without interfering with efficiency of service add appreciably to the net income.

The requirements of economy of service in residential buildings vary greatly according to the class of building and the character of the occupants; where no servant is likely to be kept provision should be made for enabling the occupants to do their work with the least possible inconvenience and effort.

Where servants are kept proper provision should be made to avoid unnecessary work, as well by the disposition of the parts of the building as by the provision of adequate facilities for service. The tendency is to substitute mechanical appliances for manual labor wherever it can be done, and especially so in those buildings occupied by persons to whom economy of first cost is not an essential, and any device which will save trouble or labor will pay for itself in the end.



## CONSTRUCTION.

Next in importance to utilitarian considerations are the requirements of construction from the commercial standpoint.

If in a building, the accommodation required and the amount to be expended necessitate the sacrifice of either sound construction or of decoration, the former should always be given the preference; for if a building is properly constructed it will always be worth while improving the character of the internal fittings, while, if it is flimsily constructed and the mechanical and sanitary appliances are inferior in quality and workmanship, any subsequent expenditure for embellishment or improvement will fail to remedy the original defects.

Before any decision can be arrived at as to the nature of the materials to be used and whether the class of construction is to be fireproof, semi-fireproof, or of so-called ordinary construction, of brick, stone or wood, the following factors will have to be considered:

1. Probable commercial life.
2. Cost.
3. Character and use.
4. Fire hazard.
5. Building laws.
6. Maintenance.

## PROBABLE COMMERCIAL LIFE.

The probable commercial life of a building should be taken into consideration when the question of construction arises. If there is every probability that its usefulness will cease in twenty-five years, it will be wasteful to build for one hundred, for figuring roughly, the net return should be sufficient to pay, during its commercial life, the cost of the building and interest on its cost as well as interest on the value of the land built on.

In a section which would seem to be fairly permanent, the erection of a first class building of superior construction would probably be justified if the rents are sufficient to warrant it.

If the section showed indications of a lesser degree of permanency, it would be better (other things being equal) to adopt a cheaper form of construction or to erect a building which could be converted to meet changed conditions.

If the section is actually undergoing changes, the nature of which are in doubt, a so-called "taxpayer" should be erected, which is a building of cheap construction of a probable life of from three to ten years and the cost of which would be met, plus taxes on land and building and some return on the land itself, from the net rents yielded during that time.

An extreme example of buildings whose commercial life lasts for a few months only are those erected for exhibitions, such as have taken place so frequently in this country since the World's Fair in Chicago. These are generally constructed of a wooden framework covered with a composition similar to plaster; they are inexpensive to build, lend themselves readily to decorative effects and are easily removable.

#### COST.

The character of construction is large determined by the anticipated rent. Thus, in a tenement neighborhood, where all other buildings are of cheaper construction, if a much more costly building for the same uses were erected, it would undoubtedly be commercially unsuccessful, as the rents of the building would be fixed by the competition of its neighbors; and there is but little variation in the rent which the tenants in such a section can afford to pay.

In general it may be said that on land of high value, the

best type of fireproof construction should be adopted; as the land becomes cheaper and the rents less, cheaper forms of construction will be necessary, until on cheap land, with cheap rents, it will be necessary to build as cheaply as the requirements of sound construction and the building laws of the city will permit. (See Principles of City Land Values, by R. M. Hurd, under head of "Types of Buildings.")

#### CHARACTER AND USE.

The character and use to which buildings are to be put must also be taken into consideration. Thus, those occupied by a large number of people, either permanently as residences or temporarily for business, amusement, instruction, etc., should be either wholly or partly fireproof, as financial considerations permit; and this should be enforced for the protection of the community by municipal and other regulations: especially is this the case in those buildings from which the egress will be slow on account of the crowded nature of the occupancy such as high office buildings, concert halls, theatres, schools, department stores and more especially, where (as in theatres) there is an extra hazard due to the means employed to obtain realistic effects. The disastrous fires and the heavy loss of life at the Ring Theatre in Vienna, the Opera Comique in Paris and the Iroquois Theatre in Chicago, emphasize this necessity.

The character of the occupancy should also be taken into consideration; thus in tenement houses, where the tenants are apt to be, if not careless and irresponsible, too busy to devote much time to cleanliness, it is well to employ such materials and such forms of construction as will admit of rough handling and easy cleaning, eliminating to some extent the very rapid depreciation to which they are subject.

In buildings occupied as dwellings by numerous people, the character of construction is in most cities regulated by building and tenement house laws. Apartment or tenement houses in New York City over six stories in height are required to be of fireproof construction; over four stories or when occupied by more than two families on each floor, the halls and stairways must be fireproof. When applied to all buildings, these regulations work no hardship on either tenants or landlords, as the tendency is to build higher as the value of the land increases; and the precautions against fire are greatest in those buildings which need it most and where the tenants can best afford to meet the increased rentals necessary for better construction. Building and tenement house laws also endeavor to enforce the erection of buildings in which strict attention shall be paid to sanitary requirements in order that the health of the tenants shall not be endangered. The more crowded the building, the greater the importance of such regulations.

#### FIRE HAZARD.

In residential or office buildings the tenants or temporary occupants as well as the landlords and property holders are benefited by the use of a more expensive form of construction for protection against fire. In other buildings fireproof construction is required for the protection of the contents. Such are buildings used for the storage of large quantities of valuable goods; the insurance on which, in a non-fireproof building, would probably pay interest on the extra cost of fireproof construction. In libraries, picture galleries and buildings containing valuable articles or documents, which, if destroyed, cannot be replaced, fireproof construction should always be used; this is also the case in buildings used for the storage of explosive or inflammable goods, such as chemical warehouses.

There are many precautionary measures which can be taken to check the rapid spread of fire and which add but slightly to the cost of building; thus, openings between floors for stairways, elevator or vent shafts, create a draft and aid greatly in the destruction of a building; they should, wherever possible, be disconnected from the main building by means of brick or fireproof walls and partitions. Wire glass as a prevention to the spread of fire is being extensively used. In frame buildings, floors, walls and partitions can be rendered safer by breaking hollow spaces, either by bridging or by a few rows of brick filling.

The proportionate increase of cost of fireproof over non-fireproof construction decreases rapidly as the building becomes more expensive; the more costly the building, therefore, the greater reason there is for the adoption of fireproof construction.

#### BUILDING LAWS.

Building in most cities is to a great extent regulated by building laws, which require safe and sanitary forms of construction. These laws, as cities grow larger and the buildings of greater cost and importance, tend to become more detailed and specific and seek to cover all ordinary contingencies and to protect the public from the erection of unsafe or unsanitary buildings, due to the ignorance or greed of builders or property owners.

One weakness of most building laws is that they fail to adjust themselves with sufficient rapidity to changed conditions or improvements; they frequently entail unnecessary and expensive methods of construction where cheaper and more satisfactory ones could be used.

## MAINTENANCE.

Very cheap construction and poor workmanship are not economical as they entail heavy expenses for repairs and frequently necessitate partial or even total reconstruction at the end of a comparatively short time.

Sound and well-constructed sanitary appliances cannot be too much insisted on; where of poor material or faulty installation, they are subject to rapid depreciation and need constant repairs; they are therefore uneconomical as well as unhealthy.

In buildings subject to very rough usage, the use of a more expensive form of construction and more durable materials will show a better net return than cheaper materials and construction which will need constant repairs; depreciation is very rapid in buildings not kept in good condition, and the cost of maintenance is least where there is no delay in making good all dilapidations as they occur.

## DECORATION.

Third in importance is the question of ornamentation, by which is meant external and internal decoration, as well as the proper proportioning of the different parts of the building, the plan and consequent elevation of which are supposed to have been settled with due regard to utilitarian requirements.

The assembling or grouping of the different units of a building may in many cases be greatly varied, and true architecture consists in subordinating the arrangement and decoration of the external and internal parts of a structure to the requirements of its use.

It is not intended to minimize the importance of architectural beauty; of two buildings, the planning and construction of which are equally satisfactory, that of which the external appearance is pleasing and the in-

ternal decorations in good taste, will be commercially more valuable and thereby justify the expenditure incurred, than in another building equally useful, but less pleasing to the eye.

There is, moreover, a continual improvement in public appreciation and whilst it is true that many people are unable to discriminate between beautiful and merely pretentious architecture, the tendency is, especially in the larger cities, for the character of the architecture to improve and for beauty in buildings, especially in some classes, to have a very decided commercial value.

The advent of an educated architect of good taste in a growing town has often raised the architectural standard of buildings in the whole community. Buildings of inferior design, comparing unfavorably with those recognized in better taste, suffer by contrast with them and depreciate in value.

The commercial value of artistic architecture is mostly in evidence in residences, either private or multiple, such as apartment houses, hotels, etc.; people are more particular about the appearance of the building they live in than they are about their places of business.

In business buildings more particularly, architectural beauty should always be subordinated to adaptability to use.

The three controlling factors having been pointed out, something may be said of the difficulty of properly adjusting their different claims; this is not always an easy matter, as they are frequently in direct opposition.

Thus, in a lofty office or store building, *constructive* requirements necessitate heavy walls, piers and columns, but on costly land, where every foot of floor space is of value, *utility* demands that the area of the supporting walls and columns be reduced to a minimum, and a conflict then exists between the requirements of *construction* and *utility*.

In the foregoing example, the commonly accepted principles of design based as they are on centuries of masonry construction, demand a due proportion between the wall space and the openings, and that to satisfy the eye the supporting piers and columns be visibly carried to the ground. *Utilitarian* requirements, however, exact a maximum of window space and the commercial desideratum (where the lower story is used for store purposes) seems to be obtained where the building appears to rest on a layer of plate glass and the whole uninterrupted front can be used for display; the requirements of *utility* and of *decoration* are here in opposition.

In contrast to the above may be cited the best possible construction from the fire engineer's standpoint, which would be a building of blank walls, containing no openings.

It is generally easier to reconcile constructive and decorative requirements than the requirements of utility and decoration. Decoration should be based on the methods and forms of construction used; but the new system of construction adopted in modern commercial buildings, involving as it does an extensive use of iron and steel, has left architects very much in the position of having to gradually evolve a new style of architectural treatment, varying from those older styles which are derived from entirely different forms of construction.



## CHAPTER VIII.

### REQUIREMENTS OF DIFFERENT CLASSES OF BUILDINGS.

Residences—Dwellings as investments—Private residences—Attached houses—High stoop houses—American basement houses—English basement houses—Advantageous and disadvantageous features of the different classes—Requirements—The entrance—Light and air—Exposure—Floor plan—Economy of service—Decoration—Outlook—Privacy—Detached houses—Semi-detached houses—Two-family houses—Duplex houses.

THE utilitarian requirements of buildings which have been described generally in the last chapter, vary in the different classes with the specific uses for which they are intended; that which is an essential in a residence may be of minor importance in a building for business purposes. It is intended in the following chapters to call attention to the particular requirements of different buildings and to their relative importance.

#### DWELLINGS AS INVESTMENTS.

As with other buildings, the tendency is for city houses to cover an increasing proportion of land as it becomes more valuable and the houses more costly; it is necessary to take into account the value of the land when weighing the respective advantages and disadvantages of different types; what may be a proper use when the land is cheap may not be so when it is costly, and vice versa.

Even eliminating the most expensive residences, the commercial value of high class houses is apt to vary

greatly from their cost; they are mostly erected for wealthy people and designed to suit their individual preferences. Those who can afford them, generally have them built from plans drawn to conform with their own ideas or, if they buy a house already built, will frequently remodel or reconstruct it to suit themselves.

Although some very expensive houses, selling as high as \$500,000 have been erected in New York City by speculative builders, who have been able to market them, such cases are exceptional and it is safe to say that the speculative building of such houses is not generally undertaken and that they are mostly erected with a view principally to the convenience and comfort of their owners, and with less consideration as to their future use or commercial value.

City houses of average size, however, may be considered, and frequently are, investment buildings; if they are well designed and properly located, they are readily rented or sold, do not fluctuate greatly in value, and should not depart in too great a degree from the requirements of the average tenant.

Although judicious individuality may add to the beauty of streets built up of detached houses, each in a setting of its own, too great freedom of architectural treatment in houses built in rows is undesirable. This is especially the case in houses of moderate cost, where exaggeration is distinctly a commercial error, few people desiring to live in too conspicuous a building; at the same time the monotony produced by row upon row of exactly similar buildings, distinguished from each other only by the numbers on the doors and by the curtains at the windows, is an error in the opposite direction.

The inartistic and uninviting effect produced on streets by the exaggerated individual treatment of facades,



**AN ECCENTRIC STREET FRONT.** Eccentricity from a commercial standpoint is undesirable and reduces the market for a building. West 70th Street, New York, N. Y. (From the Architectural Record.)

where each building is erected regardless of the others, is frequently heightened by the disregard of a common building line, some projecting beyond the main line, others setting back of it, so that even those of considerable architectural merit suffer by contact with their ill-assorted neighbors.

#### PRIVATE RESIDENCES.—ATTACHED HOUSES

The majority of private residences in large cities are built in continuous rows, adjoining one another; they may be called "attached" houses, to distinguish them from those which are "detached" and those known as "semi-detached," or twin houses.

There are in New York City, three principal types of attached houses, known as High Stoop, American Basement and English Basement houses. The High Stoop house, introduced about fifty years ago (see article on the "Building of the Modern City House," by Russell Sturgis, from Harper's Magazine), was until the last few years the prevailing type, and is still so in the outlying sections, for buildings of moderate cost; it exceeds all others in point of numbers, most of the residential sections having been built with houses of this class. It was evolved from a building somewhat resembling the English basement house, in which the ground floor, containing the living rooms and the kitchen, was only a few steps above the street level and was placed over a cellar used for storage and similar purposes. The increase in value of city land and the desire to economize space and to remove the principal rooms from the dirt and noise of the streets, resulted in gradually raising the ground floor until the cellar became a true basement with its ceiling about six feet or more above the ground level and containing the kitchen and servants' quarters, and in the smaller and more unpretentious houses, the dining room.

As the entrance to this basement was several steps below the street level, making it somewhat undesirable, the entrance to the principal story was still placed on the outside of the building, the steps leading to it being supposed to add to the dignity of the house; moreover, the basement now being appropriated to service and to some living rooms, it was found necessary in most cases to build underneath it a cellar for storage and for the heating plant, as well as to remove the basement floor from the dampness of the soil beneath it.

#### HIGH STOOP HOUSES.

This type has the advantage of providing separate entrances for trades people and for members of the family or visitors, and also economy of service when the dining room and kitchen are together in the basement, added to which the stoop has come to be looked upon, by some people, as the outward expression of respectability, as well as a convenient spot to sit and enjoy the outer air in the summer time. Another favorable feature is that the parlor on the main floor is somewhat removed from the dust and noise of the street.

The principal objections are that it is wasteful of space and uneconomical; thus, in a two-story basement and cellar house, one-half of the accommodation (that of the cellar and the basement) is of an inferior character, whereas in an English basement house of the same number of stories only one-quarter of the accommodation (the cellar) is inferior; moreover, in the high stoop house the main entrance being generally on the same floor as the principal reception room, reduces its width by the space necessary for the hall. The cost of the exterior stone steps and entrance is a large item in small houses, and, with the necessary excavation, adds greatly to the expense. This type also necessitates setting the building line sufficiently far back of the lot line

to accommodate the entrance steps, thus in some instances wasting valuable land; another objectionable feature is that every time the front door bell has to be answered it is necessary for servants to go up and down the stairs from the basement to the main floor.

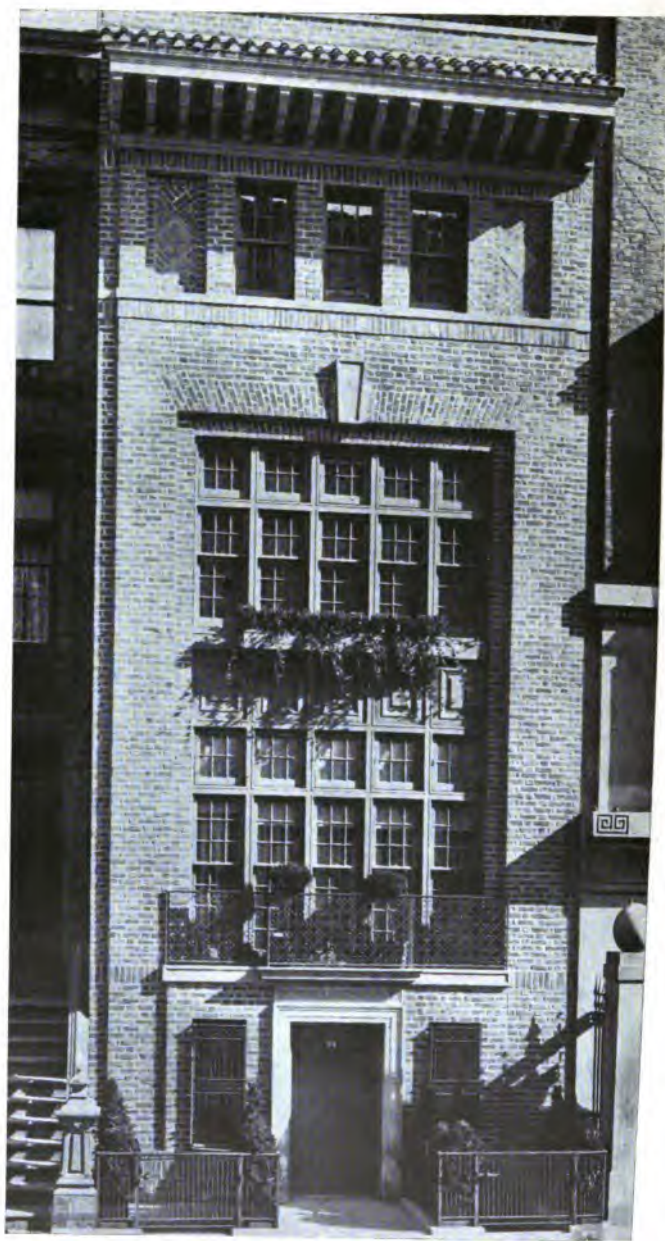
In the better class houses, both the dining room and the parlor were generally placed on the main floor, but the lack of privacy resulting from the proximity to the entrance hall and the necessary reduction in the width of the parlor frequently resulted in its being removed to the floor above, as is customary in houses in many European cities. The next logical step was the removal of the objectionable "stoop" and the provision of a main entrance at the ground level, the main floor being reached from the interior of the building, the result being the style now used for nearly all houses erected in high-class residential sections in New York City and is known as the "American basement house."

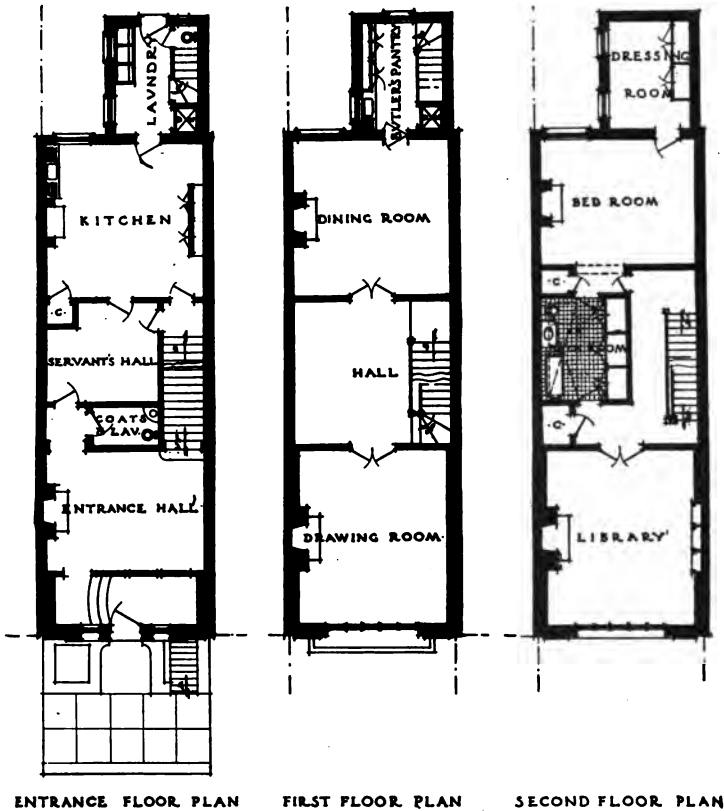
#### AMERICAN BASEMENT HOUSES.

In the American basement house the ground floor, either slightly above the level of the street, as in new houses, or a few steps below, as in reconstructed high-stoop houses, is generally used almost entirely for service and servants' quarters, except that near the entrance provision is sometimes made for a reception room for business or an ante-room for visitors; also separate entrances for the family and for tradespeople.

That the American basement house is a logical development and the best form of utilization of expensive land can be shown as follows:

In high-class residences (as has already been stated, page 48) ground floor accommodation is of less value than that of the floor above; in this type the uses of the two floors bear out this difference: the ground floor is devoted to inferior utilizations, service rooms and





AMERICAN BASEMENT HOUSE

(See facade on opposite page.)

AMERICAN BASEMENT HOUSE.—Moderate size and cost. Entrance at sidewalk level. Basement and cellar "inferior accommodation." Three upper floors "superior accommodation." East 77th Street, New York, N. Y. By permission of the "American Architect."

servants' quarters, within easy reach of the entrance, which again is sufficiently far removed from the family rooms on the main floor to insure their privacy; on this floor the rooms can be extended the full width of the house, thus providing the maximum of available accommodation. The fullest utilization of the land covered is



also made possible; the building needing no set back, can start at the lot line.

In this type, the dining room is generally placed on the main floor with the drawing and living rooms, though this arrangement can be varied to meet special requirements; the upper floors are used for sleeping rooms and for the more private life of the family. The uses of the basement have already been pointed out, the cellar being generally devoted to the heating plant, to storage, laundries, and where the house is of sufficient size, to the mechanical plant and special appliances.

The American basement type is costly and most suitable for expensive residences of four stories or more; it necessitates both a cellar and a basement for inferior accommodation and is unsuited to cheaper residences, especially those of three stories or less.

#### ENGLISH BASEMENT HOUSES.

The English basement type with its variations is in many ways the most desirable for the smaller city residences of four stories or under, erected on land of reasonable cost and is adapted to the use of people of moderate means.

It consists of a cellar, sometimes sufficiently high out of the ground to deserve the name of a basement, in which case it may contain the kitchen and service rooms as well as the heating plant and laundry and is lighted by areas at the front and rear. (This arrangement, however, is objectionable in houses for people of small means on account of the extra work entailed by having the dining room and the kitchen on different floors.) It is best to utilize the cellar for storage and heating purposes and the laundry and to place the kitchen in an extension on the main floor near the dining room. In the smaller houses the parlor will also be on the main floor, though in this case it is subject to some of the inconveniences



- (1) TYPE OF THREE-STORY ENGLISH BASEMENT HOUSE for one or two families. Suitable for land of moderate value. Has good access, and is economical.
- (2) EXAMPLE OF POOR ACCESS. The twenty-five steps which lead to the main floor of these two-family houses make them undesirable and lower their commercial value. Eastern Parkway, Brooklyn, N. Y.

which are met with in the high stoop houses. In larger buildings the drawing room will generally be found on the floor above, where the entire width of the house on the street frontage can be utilized, and the remaining portion devoted to rooms for the private use of the family.

The main objections to this type are the reduced width of the parlor when on the ground floor adjoining the entrance hall, its insufficient privacy owing to its nearness to the street and to the hall door, and the necessity which exists of using the main entrance as a tradesmen's entrance, unless provision is made for this through the basement, or cellar, by which communication can be had with the kitchen or servants' quarters by a dumbwaiter and back stairs.

English basement houses have not met with general success in New York, though they have recently been coming into favor in some locations. The more expensive houses erected of late years have been of the American basement type, whilst the cheaper houses in suburban sections are still mostly high stoop houses. A summary of the most obvious advantages and disadvantages of these three types may be given as follows:

AMERICAN BASEMENT, SUITABLE FOR HIGH-GRADE DWELLINGS OF FOUR STORIES OR MORE.

*Advantageous Features.*—Maximum utilization of first floor or most valuable accommodation, main rooms being full width of house and more suitable for entertaining.

Maximum utilization of expensive land, no set back being required for outside steps.

Good access and separation of main and service entrances.

Separation of principal accommodation (reception and living rooms) from sleeping apartments and from servants' quarters.

Removal of principal accommodation from proximity to main entrance hall and from noise and dirt of streets.

*Disadvantageous Features.*—Large proportion of inferior accommodation in basement and cellar and costliness per unit of accommodation.

ENGLISH BASEMENT AND SIMILAR BUILDINGS, SUITABLE TO DWELLINGS OF MODERATE COST OF FOUR STORIES AND LESS.

*Advantageous Features.*—Maximum utilization of first floor, when drawing room is above ground floor and may extend the full width of the house; also in this case, removal of principal rooms from noise and dust of the street.

Full utilization of the land.

Easy access and separation of service and main entrances (with kitchen in basement).

Small proportion of inferior accommodation (one story only) and reasonable cost per unit of accommodation.

Economy of service (with kitchen and dining room on main floor).

*Disadvantageous Features.*—With kitchen in basement, economy of service is less than when the kitchen and dining room are on the same floor.

With kitchen on ground floor: difficulty of separating main and servants' entrances; with parlor on ground floor: too great proximity to entrance hall, entailing loss of privacy.

HIGH STOOP HOUSES.

*Advantageous Features.*—Separation of main and service entrances.

Economy of service when dining room and kitchen are in basement.

Removal of principal rooms from dust and noise of the street.

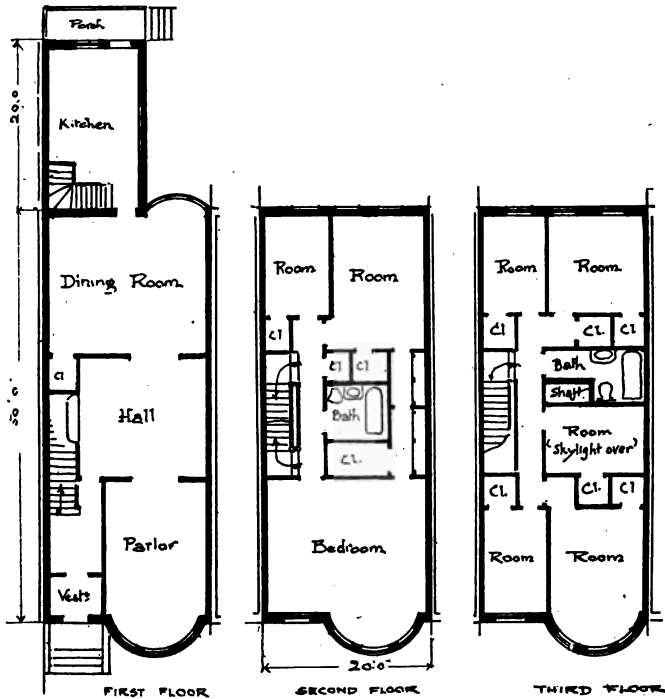


ENGLISH BASEMENT HOUSE.  
(See plan on opposite page.)

*Disadvantageous Features.*—Poor access, especially in bad weather.

Lack of privacy; principal rooms near main entrance.

Waste of principal floor, sacrificed to entrance and entrance hall.



This English basement house suitable for moderate rentals, can be occupied by one or two families. Though it is a more economical structure than the high stoop house. It is too deep and the bathrooms are poorly ventilated, moreover one bedroom on top floor receives light and air from skylight only. A shorter house and the sacrifice of some rooms would give better results.

Excessive cost of stone stoop in small houses; excessive cost of unit of accommodation.

Large proportion of inferior accommodations (basement and cellar).

Waste of space taken up by outside steps.

#### REQUIREMENTS.

In considering the relative importance of the requirements of different classes of buildings, it must be remembered that they vary somewhat with the probable mode of

life and income of their occupants; thus, the necessity for obtaining the maximum available accommodation or the greatest economy of service is less urgent in houses for occupancy by people of large income than where they may be of limited means; also, the importance of ease of access to an expensive residence is greater than in a cheap dwelling, not only from the utilitarian standpoint, but commercially. This may be reduced to the following statement: In cheap dwellings the greatest economy of available accommodation and service are most important, more so than in expensive houses, and their importance diminishes whilst the importance of good access, light and air and good planning increases in proportion to the costliness of the buildings.

#### THE ENTRANCE.

The entrance to a residence should not be of exaggerated size, though plainly evident on approaching the building.

A vestibule separating the doorway from the entrance hall is desirable; it can be kept open and used as a shelter from inclement weather by callers or the members of the family during the day time, pending the opening of the door and it can be closed at night.

Service entrances should be kept as far as possible from the main entrance and properly subordinated to it; they should, however, be readily seen and their purpose easily recognized.

Where houses front on two streets, the problem of the separation of main and service entrances is simplified, but such cases are infrequent.

#### LIGHT AND AIR.

Houses erected on cheap land, where no necessity is felt for building deeper than two rooms, are frequently

better provided with light and air than those on more costly land, where the depth is greater. Rooms which will be in continuous use should be placed where they will receive the greatest amount of light and air; bath and toilet rooms especially should have direct communication with the outside.

Though there are not very many opportunities for varying the disposition of windows in city houses, a great deal can be done by using good judgment in adjusting the size, number and position of these; one wide window frequently furnishes better light than two small ones of similar area. A judicious use of angular bay windows is also found useful at times. Care should be taken that no window is overlooked by those of adjoining houses, especially when they are near each other, as when opening on a narrow court.

#### EXPOSURE.

The question of exposure, or the situation of rooms as regards sunlight, is one which is subject to so many considerations in city buildings that each case has to be treated separately; in houses mainly for winter use, rooms with a south exposure are the sunniest and therefore the pleasantest, and a house on the north side of a street facing south is generally preferable, for this reason, to one the principal rooms of which face north. Rooms facing east enjoy the morning sun and those fronting towards the north have the steadiest light, but are apt to be dreary and lacking sunlight. Rooms with a western exposure are frequently damp and chilly if the walls are unprotected.

Prevailing winds, which have to be taken into account in country and summer houses are of much less importance in city dwellings, though those erected in situations greatly exposed to winter winds and storms



will need to be so planned that the inmates do not suffer inconvenience or discomfort therefrom, as on Riverside Drive, New York.

#### FLOOR PLAN.

The accommodation required in the average house can be divided into four classes:

First, that of a public nature, which the family share with their friends.

Second, that for the private use of the family.

Third, the means of communication between the different parts, halls, passages, etc., which are of necessity more or less public.

Fourth, the accommodation devoted to servants and service.

The degree of importance to be given to these different accommodations depends on the mode of life and habits of the occupants.

Bearing in mind what has already been said about the comparative value of ground floor and first floor accommodation in private houses, and that the latter increases in value in proportion to the former as the house becomes of a better class, we may describe the requirements of the different accommodations as follows:

Reception, dining, drawing rooms, parlors, etc., should preferably be placed on the first floor, especially in high class residences; when the houses are of cheaper grade, the ground floor is more suitable, as it is more economical of space. These rooms should be easily accessible and not too far from the main hall and communication between them should be reasonably free. Except in the cheaper grade of house, where great economy of service is desirable, the general use of dumbwaiters, speaking tubes, etc., has obviated the necessity of placing dining rooms and kitchen and service quarters on the same floor; they should not, however, be placed at too great a

distance horizontally. Dining rooms in high-class houses should not communicate directly with other reception rooms as the odor of food is otherwise distributed through them.

Libraries, if intended for the use conveyed by the name, should be situated in the quietest part of the house and not fronting on a noisy street.

City houses being generally of two or more stories in height, the privacy needed for the family rooms, such as bedrooms, nurseries, schoolrooms, etc., is readily obtained; as also their separation from those of a more public use.

The different rooms should bear a proper relation to each other, both as to size and as to position, and no rooms should be so small or so designed that they will not accommodate the necessary furniture.

The quarters occupied by servants should be within easy reach of those portions of the house where their presence is most needed; at the same time they should be duly separated from the rooms occupied by the family, the importance of this requirement increasing greatly in houses of higher class. Every house, where proper separation between the family and the service quarters is required, should be provided with a back stairway, enabling the servants to reach their own quarters without going through the main part of the house.

#### ECONOMY OF SERVICE.

Many improvements have been introduced of late years for facilitating domestic service; dumbwaiters communicating between the different floors, coal chutes, telephones, speaking tubes, mechanical appliances for the washing of clothes, of dishes, etc.; also aids to cleanliness such as tiled floors and walls in kitchens, pantries

and bathrooms. Economy of service is also dependent to a great extent on the proper arrangement and disposition of the various parts of a building with a view to convenience and to proper provision being made for the removal of waste and debris, for the storage of provisions and fuel, and for the delivery of articles of food and other purchases.

The number of servants who will probably be employed should be taken into consideration, and where the mistress of the house will probably have to do her own work, the utmost economy of service should be possible. As good service is not readily obtainable unless the servants are contented and comfortable, they should be provided with suitable accommodation and not required to work or sleep in dark and unsanitary quarters.

#### DECORATION.

The amount and quality of decoration should depend on the cost and size of the house and the mode of life of its occupants. Those who entertain on a large scale will need appropriate rooms for that purpose, and large and elaborately decorated rooms should be led up to by suitably decorated halls and corridors of proper size. Rooms devoted to the private life of the family should be simpler. The different parts of the building should bear a proper proportion to each other and this with a due regard for fitness and suitability are the main factors in good decoration.

The exterior decoration of a building or its facade, the front which it offers to public view, should not be exaggerated through striving after individuality or originality. Restraint is a desirable quality even in expensive building, especially when placed on narrow or interior lots. Corner buildings or those which stand in their own grounds lend themselves best to elaborate architectural



PORCHES TO CITY HOUSES cut off the light of the lower rooms. They are objectionable even when side light is made possible as in this case. Brooklyn, N. Y.



THE FRONT WINDOWS ON THE GROUND FLOOR of this building are dark on account of recessed porches. The buildings, moreover, were unsalable when erected, as they were too expensive for their location. Brooklyn, N. Y.

treatment; in the case of interior buildings the wider the frontage on the street, the better the possibilities it offers from the architectural standpoint.

#### OUTLOOK.

Buildings facing parks or open spaces affording pleasant views, such as those fronting Central Park, or on Riverside Drive, New York City, should make proper provision for taking advantage of their outlook, and in these cases the desirability of the use of the first floor for reception rooms, on account of the better view is most apparent.

In some houses a roof garden could easily be provided, removed from the dust of the street and suitable as a playground for the children.

#### PRIVACY.

In private residences more so than in other residential buildings the greatest possible privacy is desirable; people living in multiple dwellings do not expect and can hardly obtain this convenience to the same extent. The overlooking of windows by others of the same house or by those of adjoining houses should be avoided as much as possible, though this is frequently difficult to provide for in city buildings. In some cases, non-transparent glass of different kinds can be used to great advantage. Entrances are for similar reasons better kept apart in adjoining houses, and a vestibule at the entrance shelters visitors from the curiosity of neighbors, whilst awaiting the opening of the door.

#### DETACHED HOUSES.

In the smaller towns, nearly all residences are detached; in the largest cities, only the very wealthy or those in suburban sections occupy this class of structure; the wealthy because they can afford to occupy as

much land as they want, even when it is very costly; the others because they build on cheap land and can, consequently, use more of it than would be needed for attached houses. The sizes of the plots built on vary according to the locality, the mode of life of the inhabitants, the class of house and the cost and character of the land; the cheapest houses being generally erected on small lots, which in small communities increase in size as the buildings become more costly, then gradually diminish in large cities, until the entire frontage is built on and attached houses are erected, except in the case of a very few of the most expensive residences.

The requirements of detached houses are much the same as those of attached city dwellings of similar grades, except that the same objections do not exist to using the ground floor for the principal rooms, unless the lots are small; the use of the land being also less restricted, a more generous arrangement of rooms can be adopted.

The main advantages of detached houses are the permanent light and air on all four sides and the greater privacy obtained, together with the possibility of disposing the rooms so as to avail oneself of the best exposure. They also offer far greater scope for architectural treatment than those built in rows, and the commercial value of good proportion and design is relatively greater; the larger the surrounding grounds the greater the freedom of treatment which may be adopted, each house by reason of its setting being independent of its neighbors.

In the case of houses built close together, especially where they are not much retired from the street line, they will be viewed more as a mass and a more uniform treatment produces better results. In such cases also, a com-

mon building line should be adopted and enforced by restriction to prevent some buildings from being pocketed and their light and air cut off by others.

Greater privacy is insured by setting the building line sufficiently far back from the street, and, where possible, by raising the grounds somewhat above the sidewalk level, a gradual slope away from the building permitting also better surface drainage.

Detached dwellings built on land lying below the level of the street are very apt to be damp, and are injuriously affected by being easily overlooked.

#### SEMI-DETACHED HOUSES.

Where the cost of land is too great to allow of the use of large lots it is common to erect what are called semi-detached houses, which attached on one side, are free on the other, ensuring permanent light and air on three sides.

This type frequently permits of greater privacy and a better arrangement than would be possible with fully detached houses, built on narrow lots; the main objection is that the largest front will sometimes have an undesirable orientation. Thus in such a building erected on a lot running east and west, the long front on one side will face due north and the other half due south, making one half of the house more sunny and agreeable than the other.

It is necessary with this type so to dispose the entrances as to interfere as little as possible with the privacy of either occupant, and to insure their comfort by building the party wall as sound proof as possible; except for the party wall they should be entirely independent, and care should be taken that no window from one half of the house overlooks the other half.



EXAMPLE OF JAPANESE ARCHITECTURE.—This building, though attractive, remained unsold for a number of years after its erection. It is too conspicuous, too much of a departure from accepted types, and was finally sold at far less than its cost of production. Prospect Park South, Brooklyn, N. Y.



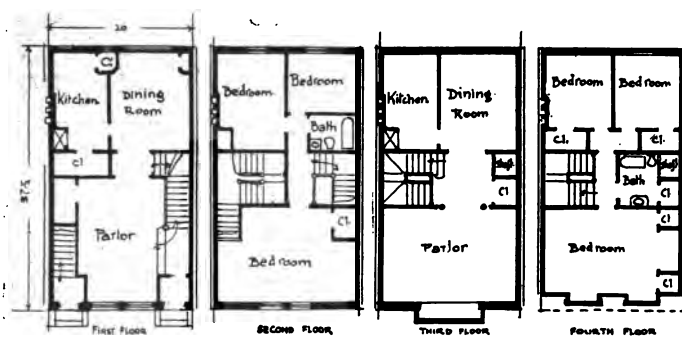
## TWO-FAMILY HOUSES.

The increasing pressure of population on land and the necessity of securing from it a greater accommodation than is afforded by houses occupied by one family only has led to the introduction of so-called two-family houses. These may be attached or detached, and, as the name indicates accommodation is provided for two families, generally on different floors. The most common types of attached two-family houses are high stoop houses provided with a basement, a cellar and two upper stories, and those with only a cellar in addition to the two upper stories.

The first type is subject to the same disadvantages pointed out in the high stoop private house; it is uneconomical, and this when economy is especially desirable, and necessitates a sacrifice of privacy. It is, however, very popular in the outlying sections of New York.

The two story and cellar house is far more economical and less wasteful of space, but, as generally built, three or sometimes even four rooms deep, it is, as well as the high stoop type mentioned above, open to the objection that only the front and rear rooms receive direct light and air, the interior rooms of which there are one or two on each floor, receiving no direct light and air, only that which reaches them through windows placed in the partitions adjoining the rooms opening to the outer air or through skylights on the top floor; these houses also lack privacy, and it is impossible to properly separate living from bedrooms.

These interior sleeping rooms should not be allowed; they could, at comparatively small expense, be made to open on small light courts; as they are now built they entail either a total sacrifice of privacy or an insufficiency of proper ventilation. Such rooms are not allowed in tenement houses where a minimum of light and air is insisted upon in every case.



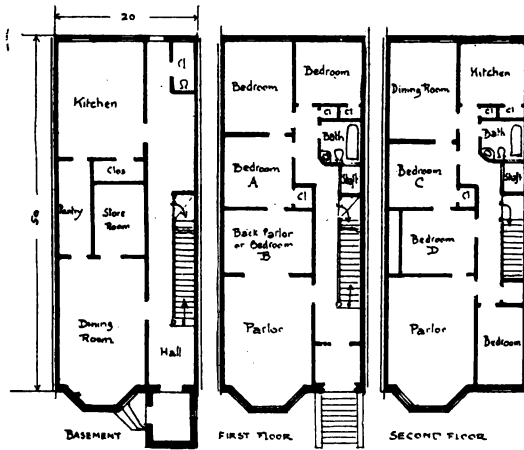
TWO-FAMILY "DUPLEX HOUSE."



**TWO-STORY AND BASEMENT HIGH STOOP TWO-FAMILY HOUSE.**  
See plan on opposite page.

#### **DUPLEX HOUSES.**

Duplex houses, generally four stories high, two to each family, though more expensive than the foregoing type, permit of a far better arrangement of rooms, a thorough separation of living from sleeping rooms, and good light and air; also the entrances to each portion are separate and distinct, making them suited to a higher class of

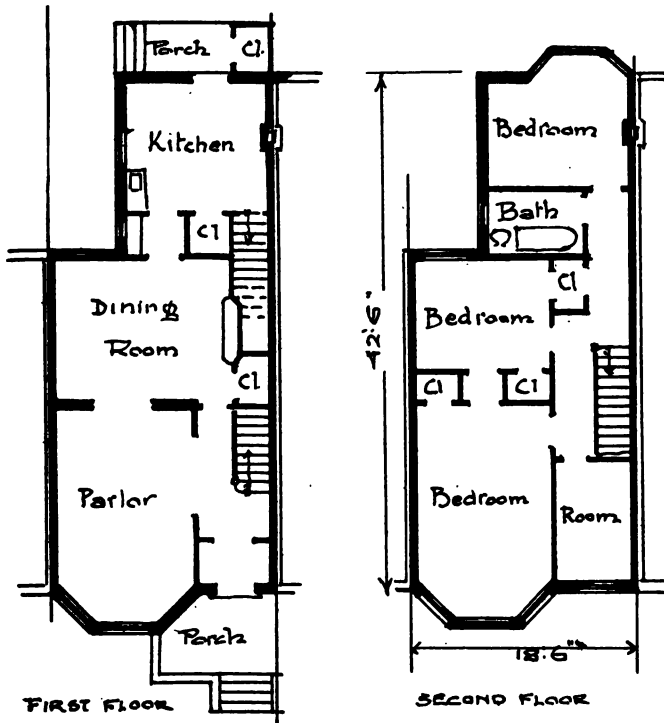


PLAN OF HOUSE ON OPPOSITE PAGE.

occupancy. The principal objection to duplex houses is the amount of space needed for the two separate entrances on the ground floor, the difficulty of making proper provision for tradesmen's deliveries, especially to the occupants of the upper apartment, and the fact that the latter are obliged to walk up two flights of stairs before reaching their own main floor.

The two-family "duplex house" built by the Kings & Westchester Land Co., and shown herewith, occupies approximately on four floors the same superficial area as the two-story and basement two-family house (also shown) does on three floors. The level of the basement of this latter house is, moreover, several steps below the sidewalk.

All rooms in the first house have direct light and air. Greater privacy is insured by the living rooms being on a separate floor from the bedrooms, and though the two stairways take up a good deal of room they permit entire separation of the occupants.



The small one-family house erected in rows is far preferable to the two-family house shown on page 143 with or without basement. Every room has direct access to light and air, every family is self contained and can enjoy the fullest amount of privacy.

The entire basement in the other house is given over to two rooms and an interior storeroom. Four of the bedrooms lack direct light and air, and the occupants are obliged to use a common entrance.

The duplex house is a higher class house than the other. Both are built in rows, and both have cellars.

Two-family detached houses can be built with entirely separate entrances, and all the rooms may be made to

open to the outside air. They lack privacy, however, though compact in arrangement and permitting economical service, as with the exception of the attic, generally divided between the occupants, the rooms are on one floor, as in most apartments.

## CHAPTER IX.

### MULTIPLE OR COLLECTIVE RESIDENCES.

Apartment houses—The entrance, the main hall and corridors—Light and air—Exposure—Floor plan—Economy of service—Construction—Decoration—Privacy—Use of roof for recreation and playgrounds—Duplex apartments—Apartment hotels—Hotels—Tenement houses—Entrance—Light and air—Floor plan—Economy of service—Construction.

**W**HEN residence land in cities reaches a high value, owing to pressure of population with or without other contributing causes, the tendency is to secure additional accommodation by erecting multiple or collective residences, generally called apartment houses or flats.

London, the topography of which allows free expansion and which was the first city to adopt any comprehensive system of rapid transit, is comparatively free of this class of buildings, and although a certain number have been erected in recent years, it may be called a city of independent residences. Paris, with a smaller population, whose growth is impeded by the fortifications which still surround it, is essentially a city of apartments.

New York, hemmed in on all sides by water, and which was until about thirty years ago a city of independent residences, has since that time rapidly increased the number of its apartment houses and is undoubtedly destined to be in the near future, even if it is not so already, almost entirely a city of apartments.

The first apartment house erected in New York City



Poor entrances at the foot of the openings between the buildings. It has been found necessary to put iron gateways at these points to indicate the location of the entrances. Moreover, the buildings were too costly for their location which did not warrant a height of more than four stories. They were foreclosed and sold for less than the cost of production. Glenada Place, Brooklyn, N. Y.



Poor entrance to Apartment House in recess at A. The doors at B are basement entrances only. Franklin and Jefferson Avenues, Brooklyn, N. Y.



was built from the plans of Mr. R. M. Hunt in 1869; the apartments were termed French flats, the idea having been imported from Paris, where Mr. Hunt had received his architectural education. This venture was commercially successful and was rapidly followed by others. Originally all these buildings contained what were called housekeeping apartments, which were each entirely independent and self-contained. They were followed by a still further extension of the co-operative housekeeping idea, embodied in so-called apartment hotels, where the cooking is done in a common kitchen and meals are generally served in a common dining room, and where also chambermaids' and other service is supplied to the tenants.

The majority of New York City apartment houses not of the expensive class, as erected up to within a few years ago, were deficient in light and air, lacked privacy, and were exceedingly poorly arranged, due partly to the small unit adopted, which was generally the ordinary city lot, fronting twenty-five feet on the street and running to a depth of one hundred feet, partly to the greed and ignorance of the speculative builders by whom most of these buildings were erected. The new tenement house laws adopted in the years 1901, 1902 and 1903 have resulted in the use of an increased unit for ordinary apartment houses of between  $37\frac{1}{2}$  and 75 feet frontage for a lot depth of one hundred feet, and by this means, as also by their general requirements, have been of great benefit to the occupants of both cheap apartments and tenements.

The increase in accommodation derived from land utilized for apartments as compared with that on which private dwellings are erected can be best illustrated as follows: the ordinary city house generally occupies a lot 20x100 feet; five families can therefore be accommodated on a space one hundred feet square; on the same

space covered by a six-story apartment house from twenty-four to thirty-six families can be housed. If the land is worth \$5 per square foot, or \$10,000 per family in the first instance, in the apartment house each family will utilize from \$1,400 to \$2,000 worth; moreover, where the cost of the private house would be from \$10,000 to \$15,000 for each family, the apartment house may average from \$5,000 to \$8,000 per family for a somewhat similar class of accommodation.

The apartment house, which has been a recognized type of residence building in this country only for about the last thirty years, is being adopted in nearly all the larger communities; the rapid growth of population and the increase of city land values, together with the difficulty of procuring adequate domestic service, and also the saving of expense due to central heating and lighting plants tends to stimulate their erection and use.

The willingness of families to live collectively in these buildings, the introduction of which was originally caused by the high price of land, has reacted on the values of the land and has resulted in localities suitable for such buildings, in a more rapid increase than would otherwise have occurred. It is to be regretted that in large cities apartment houses and flats are mostly supplied by speculative builders, who, their only object being to realize as quickly as possible on their investment, are apt to pay more attention to outward appearance than to those portions of the structure in which poor quality is not apparent at first sight, with the result that they are frequently too cheaply built, subject to rapid depreciation and expensive to maintain. In addition the necessity of building for sale often results in the adoption of a unit too small to allow of a satisfactory plan, the object being to bring the investment within the reach of a larger number of purchasers.

More satisfactory results can be obtained with large plots, economizing space used for entrances, halls, corridors, stairs, etc., reducing the cost of construction per unit of accommodation, and permitting more economical planning and arrangement and a proper distribution of light courts; this is especially the case when the lots are more than the average depth.

The uniform size of most city lots is unfortunate in many ways; it is the cause of too great a similarity in planning and results in the adoption of a few prevailing types, after which are patterned the majority of apartment and tenement houses, as well as the ordinary class of residences.

The principal utilitarian and commercial requirements of apartment and flat buildings can be described as follows:

#### THE ENTRANCE, MAIN HALL AND CORRIDORS.

The entrance to an apartment house differs from that of a private residence on account of its more public use; it should be sufficiently spacious and attractively decorated; a more elaborate treatment is desirable than in the private portions of the building.

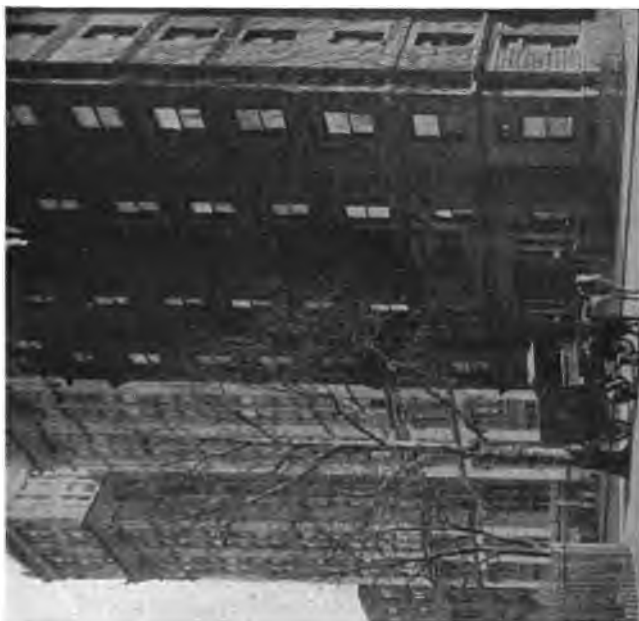
Except in buildings of large size, where a forecourt of good width can be made the main approach to the entrance or entrances, these should start at the street and not, as is sometimes done, at the back of a narrow court, or recess, where they are not readily seen.

Public corridors leading to the different apartments should be so arranged that they need not be made use of for communication between the different rooms of any apartment; they should be well lighted, as short and direct as possible and of greater width than those for private use.

The stairway is of most importance in buildings not



Over one-third of this frontage on ground floor occupied by an unnecessarily wide entrance, sacrificing accommodations and light of apartments. Less than one-third is used for windows. Eighteenth Street, Brooklyn, N. Y.



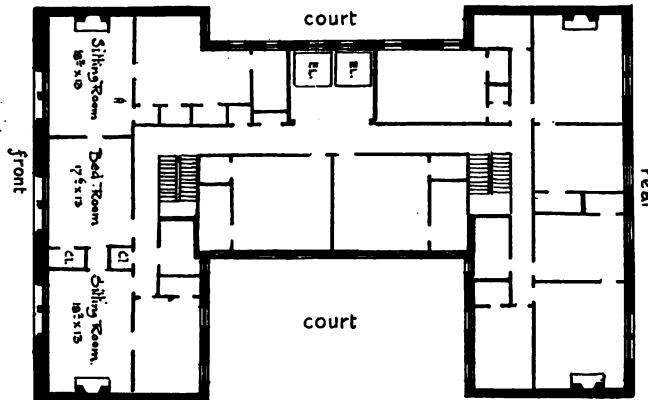
Showing the different appearance of the new Apartment Building to the left with wide court, built of light material and with plenty of window space. Contrast with building to the right with a narrow forecourt furnishing insufficient light to windows opening on it. Built of dark brick and stone. Gramercy Park, New York, N. Y.

provided with elevators, which are found necessary in nearly all apartment houses over five stories in height unless they are of the cheapest class.

#### LIGHT AND AIR.

The tendency to overbuild expensive land at the sacrifice of necessary light and air is offset to a great extent in large cities by municipal regulations and tenement house laws, prescribing the maximum amount of land which may be covered, the minimum size of rooms, and generally insisting on adequate lighting and ventilation to each room. Frequently the legal minimum of light and air is provided, even though far better commercial results could be obtained by the sacrifice of some undesirable accommodation to a better permanent supply of light and air for the rest of the building.

Sometimes light borrowed over adjoining property enables a building to earn, in excess rental, an annual amount more than sufficient, if capitalized, to acquire



**FRONTAGE NOT USED TO BEST ADVANTAGE.**—In the plan of this Apartment Hotel on West 45th Street, New York City, the entire front is taken up by three rooms out of thirteen on entire floor. The error consists in not having the long axis of these rooms at right angles to the street, when four rooms at least could have been supplied with outlook on the street.—From the "American Architect."

the adjoining property. Failure to secure this advantage will eventually result in this source of income being destroyed by the erection of a building.

#### EXPOSURE.

Courts and light wells should be so planned as to secure the greatest possible amount of sunlight for the longest period of time daily. The limiting conditions are so great that the orientation of rooms according to their use is only possible in very large and expensive apartment houses. In the article by Mr. Hill, already referred to and published in the *Architectural Record*, he points out that the best orientation for light courts is where their axis is about twenty-two degrees east of north.

#### FLOOR PLAN.

Economy of planning and construction necessitate a great deal of duplication in apartment houses, the greatest economy being obtained when each floor is a replica of those above and below it.

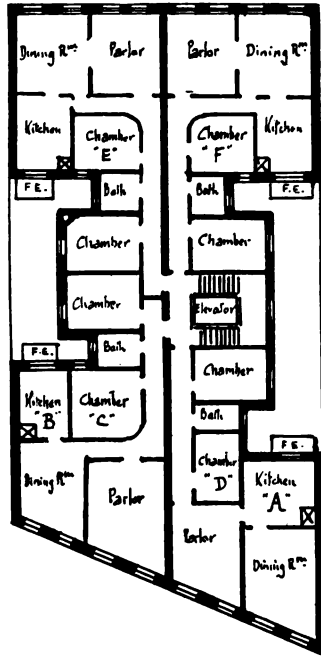
Ground floor space being less desirable than that above, except where it has a semi-business value, as for doctors' offices, or in the cheaper class of apartments, where it is available for shops, the accommodations on the first floor, which nearly always commands the highest rents, should be given first consideration.

Every effort should be made to separate the rooms for common use and for the reception of guests from those for the private use of the family. Reception rooms should be readily accessible from the main entrance, the sleeping apartments withdrawn from it, and having the bathrooms conveniently placed and easily accessible from them. In the better class apartment houses the sleeping rooms are entirely separated from reception, dining and living rooms, which again can be cut off from the ser-

vants' quarters by closing a door. The kitchen and domestic dependencies should be convenient to the dining room, and yet duly separated from the remainder of the family rooms.

These requirements increase in importance in buildings which are erected in high-class neighborhoods for occupancy at high rentals; the tenants in buildings at cheap rentals are less particular, and their mode of living requires convenience and economy of service before comfort or luxury. The use of two flights of stairs instead of one will frequently give a more economical arrangement, the rooms being centrally grouped around the entrance, instead of strung out in a line one room wide and from five to ten deep, necessitating long corridors which are, except on corners, insufficiently lighted from long and narrow courts. Halls should be as short as possible, compact arrangement doing away with the necessity for long and wasteful corridors. The main reason for the use of so-called railroad flats has been the desire to give tenants at least one room with frontage on the street, partly on account of the uninviting appearance of the rear of the building, which in the cheaper apartments is used for drying clothes. If the rear yard were laid out in an attractive manner with shrubs and flowers, rear apartments would be more desirable and other arrangements could be made for drying the laundry. A most pernicious arrangement sometimes met with is where the kitchen, pantry and bathroom open onto a small air-shaft which serves similar rooms on all the stories.

Excepting in the cheapest class of buildings, no room should be the only means of access to other rooms, and in no case should this access be had only through a sleeping room. Care should be exercised in supplying convenient closets and cupboards for storing provisions, clothes and other articles, especially in the cheaper apartments, where economy of space is most needed.



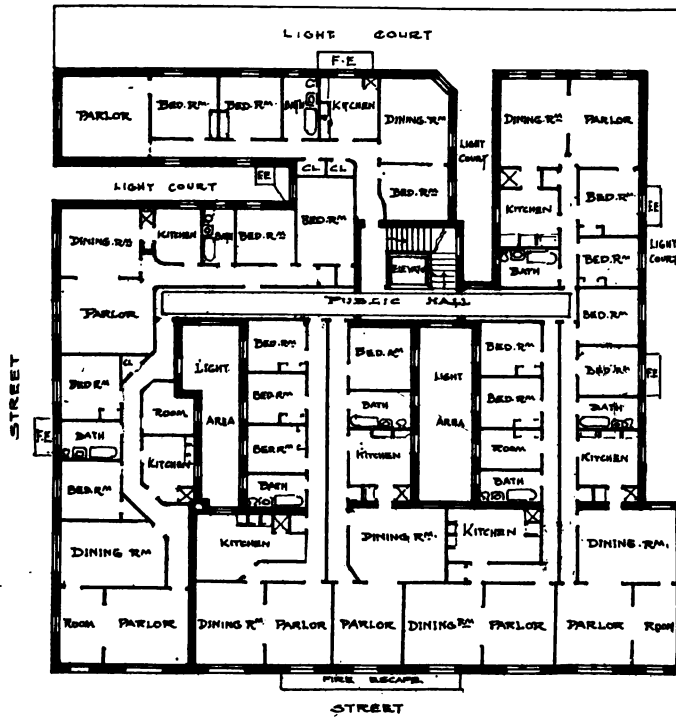
#### A BADLY PLANNED APARTMENT HOUSE.

The average speculative New York apartment, even of the elevator class, is unattractive in appearance and its rooms are insufficiently supplied with light and air. In this building only 8 rooms out of 20 have good light. Chambers C, D, E, F are particularly poorly lighted. The courts are of insufficient size for a building 7 stories in height. Kitchen A can only be reached through the parlor, kitchen B through dining room. Reception rooms are too far from elevator, and visitor passes bathroom and chambers to reach them.—Amsterdam Avenue, New York.

#### AVAILABLE ACCOMMODATION.

Properly proportioned rooms of such dimensions that they will accommodate the necessary furniture are more economical than those whose shape precludes a convenient arrangement of contents. The light available from street frontages and courts should be used to the best advantage, and generally the rooms so disposed that their longest sides are at right angles to the frontages having the most light and the most pleasing outlook.

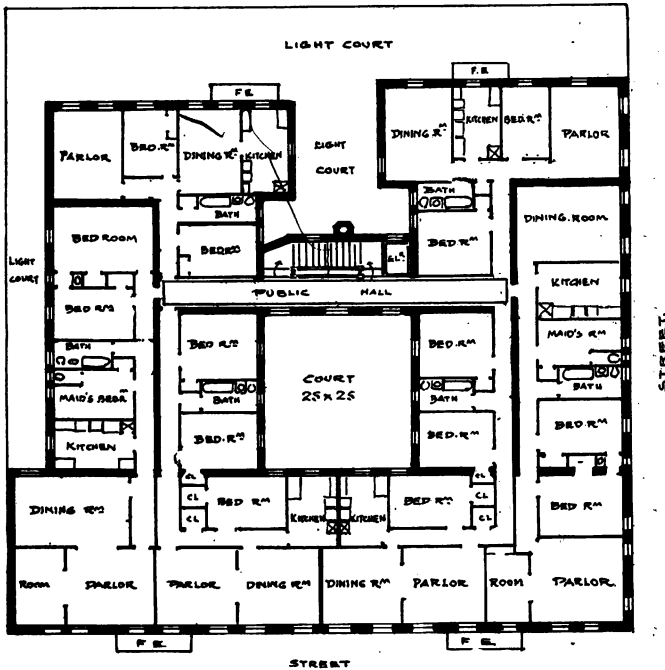




#### FAULTY PLANNING AS TO LIGHT.

Lack of concentration of light areas and courts results in destroying the advantages of good units of size for apartments. In this seven-story apartment house, on a plot approximating 100 feet square, out of 45 rooms provided, only 15, or 33% (those fronting on the streets), have adequate light and air. This arrangement necessitates long and wasteful passages, and many of the rooms are of inadequate size. Most new-law tenements for cheap occupancy have better light and air than this elevator apartment on Seventh Avenue, New York.

As much as possible, light courts should be planned so that the rooms fronting on them may not have their light cut off by surrounding buildings already up or which may be erected. In Paris, the home of apartment houses, the light courts of each building are frequently made practically independent of those of other buildings.



#### CONCENTRATION OF LIGHT AREAS.

This six-story apartment house of approximately the same size as the one shown on preceding page, by better concentration of light courts provides far more light and air to most of its 36 rooms, which, given similar locations, would bring a larger rental than the 45 rooms of the previous plan. The main objections to this arrangement are the long private halls and the distance of the living rooms from the entrances of each apartment.

Permanently lighted rooms are of more importance than accommodation which may be rendered untenable by having its light cut off. Interior accommodation should always be sacrificed to better accommodation and waste space avoided.

#### ECONOMY OF SERVICE.

Nearly all apartment houses, even the cheapest, are provided with a tradesmen's entrance to the basement, in which are installed dumbwaiters accommodating each

apartment. In the higher grade houses there are, in addition to elevators for use by the tenants, one or more service elevators communicating with the kitchens and service rooms of the various apartments. In all buildings proper provision should be made for the removal of ashes and debris, as well as for necessary storage.

Where servants will probably be employed, provision should be made for rendering their work as easy as possible, and all modern aids to service and to cleanliness adopted where possible. Tiled bathrooms, kitchens and pantries, etc., are easily kept clean, and so are open plumbing fixtures, all parts of which can be easily reached. The fewer the number of servants likely to be employed the greater the ease of communication which should be provided between the kitchen and service rooms and the dining rooms. In the cheaper apartments, where it is probable that the mistress of the house will have to do her own work, or will employ but one servant, the trouble of housekeeping should be reduced to a minimum by careful planning.

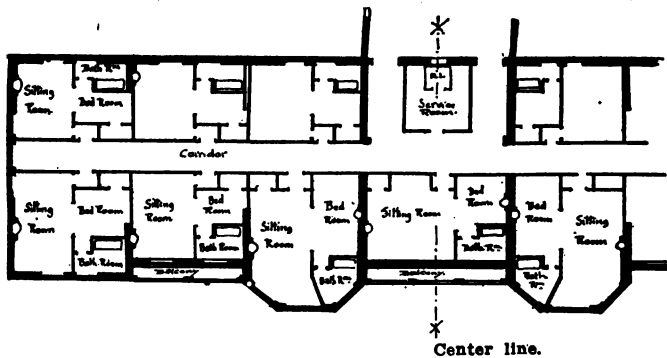
#### CONSTRUCTION.

The construction used in apartment houses is in all large cities regulated to a certain extent by building and tenement house laws. Thus in New York any apartment house exceeding six stories in height must be of fireproof construction; there are also other regulations covering the erection of stairways, public halls, ceilings of basement, etc., which must be of fireproof materials under certain conditions.

Leaving aside the question of what is required by law, the same rules apply to these as to all other buildings, viz.: the cost should be proportionate to the cost of the land, the cheapest buildings therefore being erected on the cheapest land. Sound construction and sanitation should be enforced in all cases, and the ornamentation

of the building should be subordinated to these first requirements. Sanitary appliances should always be of good manufacture and well set up; nothing deteriorates more rapidly than inferior plumbing or heating appliances.

The cheaper flats frequently have no central heating plant, but the better class apartments are generally provided with a system of house heating, either hot water or steam, as well as a provision of hot water for use in the apartments; also frequently laundry machinery and other improvements. The number of mechanical appliances provided depends entirely on the class of tenants catered to and the rents which it is expected will be obtained. Wherever it is decided to use such appliances they should be of sound construction, otherwise they are better left out.



PLANNING FOR EXTERIOR ONLY.

This particularly objectionable plan shows an entire subordination of interior arrangement to exterior effect. The symmetry of the facade necessitates the same size window for a small bathroom as for a large sitting room. Bedrooms have no windows, borrowed light and air only. London, England.

The quality of materials to be used, the amount of ornamentation on the exterior and the class of interior finish and decoration depend on the class of building and the rents to be obtained. Floors and partitions should

as much as possible be so deadened as to prevent the tenants of one apartment from causing any annoyance to others. It would be desirable to avoid the use of galvanized cornices and bay windows, applied exterior stucco and similar ornamentation which is of short life, needs constant repairs and soon looks shabby. In public halls or those portions of the building which will receive the hardest usage, permanent materials should be employed as much as possible, such as tiled floors and marble or cement wainscoting, depending on the character of the building.



COMMERCIAL VALUES CONTRASTED.

The five story building on the right has a lower gross rental than its four storied neighbor and is always from 80% to 50% vacant on account of poor planning and dark rooms. Though it cost considerably more to build, its commercial value is less. 34 St., Brooklyn, N. Y.

## DECORATION.

The amount and quality of interior and exterior decoration depends entirely on the character of the building. Entrances and public halls and the apartments for daily use and for the reception of guests are naturally more suitable for ornamentation than private rooms, which should be simpler in design and finish.

## PRIVACY.

Privacy is most important in the higher class buildings; in the cheaper ones a certain amount of privacy has to be sacrificed to other considerations. In all cases, however, bedrooms should be kept as much as possible separated from living rooms, and kitchen and service quarters from both. A very objectionable feature in the ordinary grade of apartment house, and which could frequently be avoided by careful planning, is the overlooking of one room by others of the same or different buildings; windows facing on narrow courts should not be directly opposite other windows, especially when these belong to other apartments. By closing the door leading to the public corridor, every apartment should be entirely cut off from the rest of the building, giving the inmates entire privacy and freedom from intrusion.

## USE OF ROOF FOR RECREATION AND PLAYGROUNDS.

The roofs of apartments are sometimes used for recreation and roof gardens. This use, which has been facilitated by the increased size of the units now employed, should be encouraged as much as possible, especially in the cheaper grades and in tenements. One of the most unfortunate results of the crowded conditions in cities and of life in apartments and tenements is the fact that the only playground of the children of tenants is on the streets. If the roofs of all such buildings were so constructed that they could be used as playgrounds for the

children and as breathing spots for their parents, one of the most serious of city problems would be solved, and the children would enjoy better air with practically no danger.

#### DUPLEX APARTMENTS.

These are similar in requirements to the ordinary apartment house; they allow a better separation of living and sleeping rooms by their being on different floors. Sometimes one story with high ceilings is devoted to living and reception rooms, and the one above, needing less height, to sleeping rooms. In other cases the front of the building will be used for living and reception rooms with higher ceilings than the rear portion, which is divided into more numerous stories devoted to sleeping rooms and to those of secondary importance. Either arrangement has its advantages, though the second is more economical of space. The main disadvantages of duplex buildings is that service in them is less economical owing to each apartment having two separate floors; they are therefore more suitable to expensive buildings than to the cheaper grades.

#### APARTMENT HOTELS.

These are similar to apartment houses, except that they have a common kitchen and dining room for the use of all the tenants, and that domestic service is provided by the management and added to the rent.

These buildings are frequently provided with very elaborate mechanical plants and supply their own heat, light, refrigerating and elevator service, filtering of water, etc.

#### HOTELS.

Hotels being principally for the use of transient guests, and not for permanent tenants, require in addition to private sitting rooms and bedrooms, public re-



JONATHAN CLUB, PACIFIC ELECTRIC BUILDING, LOS ANGELES, CAL.  
Why not use the roofs "now usually wasted" of New York apartment and tenement buildings for "roof gardens" where the children can play in safety?  
From the "American Architect."



ception and sitting rooms, reading and writing rooms, etc., depending on the class of guests to be catered for, and the prices to be charged for accommodation.

The commercial success of both hotels and apartment hotels depends to a great extent on management. In apartment houses each family is self-contained, and the housekeeping and catering are in charge of the mistress of each establishment. In hotels and to a lesser degree in apartment hotels, the management is central, the care of the building, domestice service, catering, supplying of provisions, etc., being in charge of a resident manager, assisted in large buildings by numerous employees.

The proportion of carrying charges to total receipts is in both these buildings very high, and the rent paid is partly for accommodation, partly for management. In hotels, especially those of high class, economy of service is of great importance, also ease of access from main halls and entrances to the various parts of the building. Costly decoration of the rooms for public use is desirable on account of its advertising value, as well as for its attraction to the tenants of the building.

All transient hotels in cities should be of fireproof construction on account of the large number of people occupying them and the difficulty of notifying them all in case of fire. This requirement should be enforced by law. The cost would not add materially to the charges for accommodation, which are regulated to a great extent by the running expenses.

The commercial value of hotel properties varies greatly, their success being due more to good management and good location than to the building itself. The market for them is limited, and they are frequently very hard to dispose of.



ROOF GARDEN, JONATHAN CLUB, PACIFIC ELECTRIC BUILDING, LOS ANGELES, CAL.  
From the "American Architect."

## TENEMENT HOUSES.

The legal definition of a tenement house in the State of New York is "any building occupied for residence purposes by three families or more living independently of one another." Rules and regulations governing the erection of tenements apply therefore to all apartment houses whatever their character, as well as to those which would ordinarily be described as tenements, the word tenement in ordinary use being restricted to such buildings occupied by the poorer classes.

Tenement houses are the result of congested population; the laboring classes who find it necessary to live in places accessible to their work and who for social reasons prefer congested conditions, are obliged to take such accommodation as is offered them. The result is that where in cities rapid growth of population, combined with poor or expensive transportation, creates a strong demand for certain locations, the tendency is for the owners of the property to extract from it the greatest available amount of housing accommodation, regardless of sanitary or moral conditions.

The tenement house problem is probably more acute in New York City than in any other civilized community owing to its rapid growth, its position on a long and narrow island preventing lateral expansion, and its inadequate transportation facilities.

The increased pressure of population on Manhattan Island and the advance in rentals in the tenement house quarters, together with some improvements in transportation, have in the last few years caused an overflow of this class of tenants into the surrounding territories of Brooklyn, Long Island City and the Bronx. The encroachments of business and the large amount of tenement house property taken for public improvements have helped to accentuate this outward movement, and with-

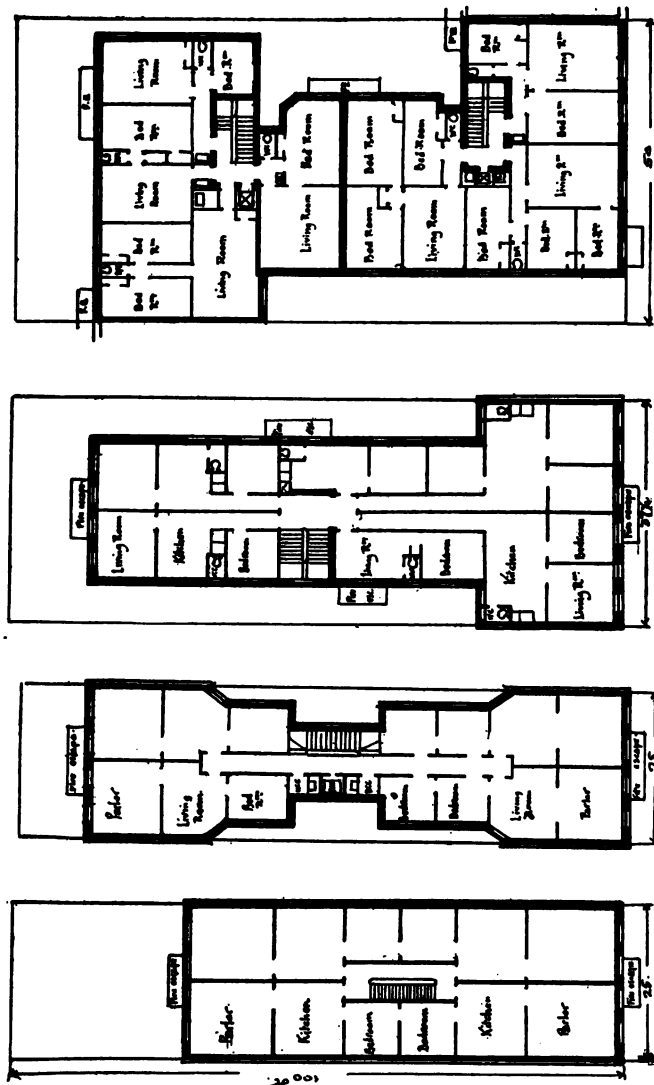
out diminishing the crowded condition of the older tenements districts, have carried similar conditions into sections formerly much more sparsely populated.

Nearly all large cities are confronted with the problem of how to provide sanitary dwellings for the poorer working classes, but in New York this problem is greatly aggravated by the cosmopolitan nature of its population and the tendency of the members of each different nationality to congregate together in separate sections.

Moreover, the housing of the working class in New York has been and still is almost entirely in the hands of speculative builders, who are only interested in selling their buildings at a profit as rapidly as they are completed.

The rigid tenement house laws enacted in the years 1901, 1902 and 1903 have brought about a great improvement in these buildings, both as to character of accommodation and class of construction, and speculative builders, much to their surprise, have discovered that it is quite as profitable to supply better habitations than the unsanitary buildings in which the greater portion of the population of the city have in the past been forced to live.

The New York tenement house laws have proved beyond doubt that it is commercially profitable to supply to the poorer working classes buildings adequately supplied with light and air, with proper sanitary appliances, some degree of privacy and inducements to cleanliness. The general tendency which exists amongst the majority of men to try and elevate themselves and to procure for themselves and their families a larger degree of comfort and convenience, shows itself first of all in the desire amongst the more thrifty of the working classes to better their housing accommodation, and in their willingness to pay an increased rent for superior accommodations and surroundings. This tendency results in the better



EVOLUTION OF THE NEW YORK TENEMENT HOUSE.

Prior to 1879.

Four rooms only out of 12 have direct light and air.

1879.

Four rooms only out of 14 have direct light and air.

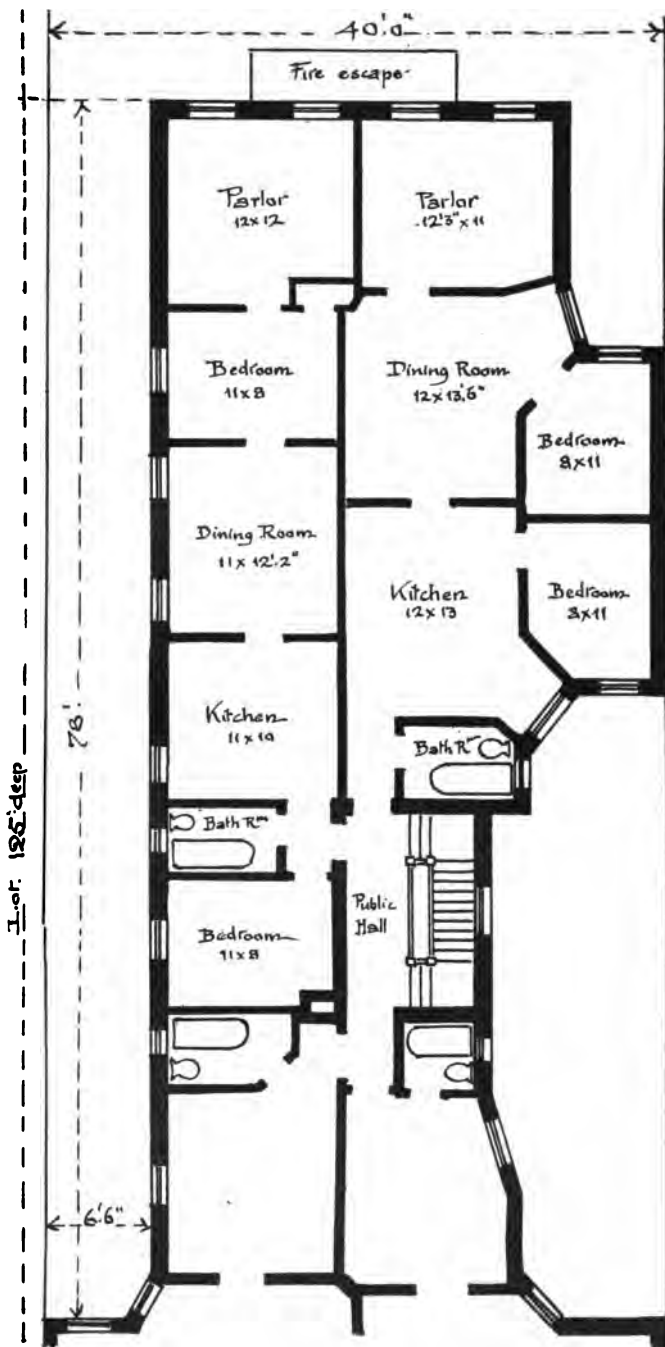
1904. (Law of 1901.)

All rooms have direct light and air. (Light courts and corridors reduced to a minimum.)

1907.

All rooms have direct light and air. This is a better unit of size; halls and corridors reduced to a minimum.

Nos. 1, 2 and 3 from "Record and Guide." No. 4 from "Architecture and Building," M. J. E. Ware, Architect.



#### A DEEP BUILDING BADLY PLANNED.

Lot 40 by 125 feet, building 103 feet deep. The desire to eliminate lengthy corridors and to obtain the maximum of accommodation, and the use of only one stairway, has resulted in an entire sacrifice of privacy. The Parlor in flat A can only be reached through the Kitchen, Dining Room and one Bedroom. Rooms giving on the Court 6½ by 7½ feet would be almost entirely deprived of light and air by an adjoining building. The flats fronting on street and not shown here are equally badly planned. Brooklyn, N. Y.

class of tenants gravitating to the newer tenements, which are seldom long in being filled, bring in larger rentals than inferior accommodation, and hold their tenants much better.

The raising of the unit of tenement house construction in New York City from twenty-five feet to from thirty-seven and one-half to seventy-five foot frontages has had the peculiar result that these buildings, which will average about six stories in height, frequently contain rooms with better light and air than in many high-class apartment houses, which though built from ten to twelve stories in height, are permitted to occupy almost as much land as the lower buildings.

Amongst other requirements, the New York tenement house laws specify the following:

Corner buildings shall not cover more than 90 per cent. of the lot.

Inside buildings shall not cover more than 70 per cent. of the lot.

Height of the building shall not exceed one and one-half times the width of the widest street on which it stands.

At least one room in each apartment shall contain a minimum of 120 square feet of floor area, and all rooms except attic rooms shall not be less than nine feet in height.

Windows shall be in size at least one-tenth of the superficial area of the room, and no window shall be less than twelve square feet in area.

Any rooms occupied for living or sleeping shall have at least one window opening on a street, yard or court.

All stairs shall be at least three feet wide.

No basement or cellar is allowed to be used for habitation unless the ceiling is at least four feet six

inches above the street or ground outside, and unless the room is nine feet high in new buildings, or at least seven feet high in converted or old buildings.

When land is cheap and three-story houses are desirable to let at cheapest rentals, the semi-detached house is sometimes used, giving every room direct access to light and air, also good circulation between the houses. In such buildings, windows should not directly face each other across open spaces.

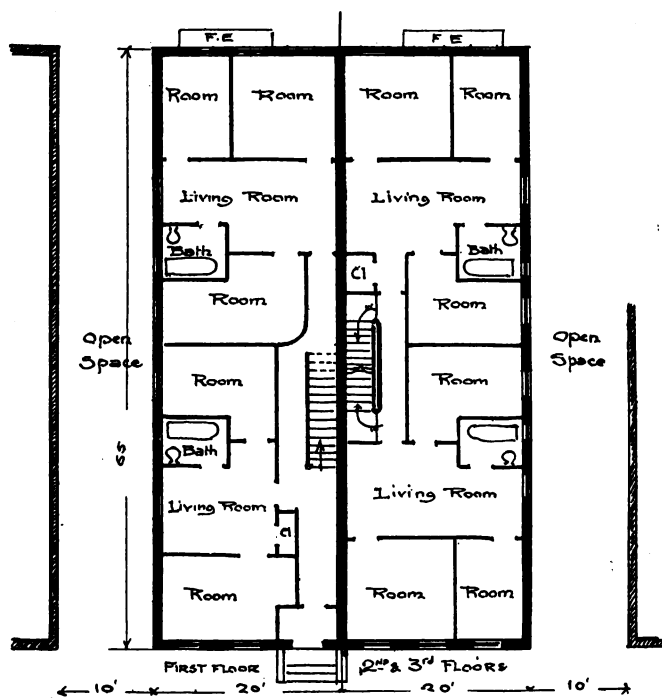
#### ENTRANCE.

A light, clean and attractive entrance hall is of decided value and is an inducement for tenants to keep their own premises as clean as possible, whilst a dark, dreary and dirty hall has a depressing effect and detracts from the value of the property. The material used should be such as will stand rough usage and be readily cleaned.

In some model tenements the stairs are open to the air, though roofed over for protection against the rain, the assumption being that the tenants when using them will be clad for the streets, and will therefore not suffer from exposure in inclement weather, whilst the building will benefit from the better ventilation afforded.

In the higher buildings not situated on main traffic streets, where there is a demand for small shops, it is customary to raise the ground floor four or five feet above the curb, using the basement (under which there frequently is no cellar) for shops and living rooms. This practice, though economical in that it allows the fullest utilization of all floor space, is not entirely commendable; the shops are not desirable, having to be reached by several descending steps, and the rooms in the rear of them, receiving light and air from the court only, are not always healthy. The placing of shops in the basement or on the ground floor of almost every tene-





THREE-STORY SEMI-DETACHED HOUSES.

ment house of five or six stories in height is due to the desire of the tenants to make their daily purchases as close at hand as possible, resulting in a large number of small shops, each making a very precarious living, instead of less numerous shops at corners or on traffic streets, offering better selections at lower prices. In locations where shops are plainly desirable these had better be entered at the curb level, not too high or of too great depth; living rooms back of them will then be light and healthy.

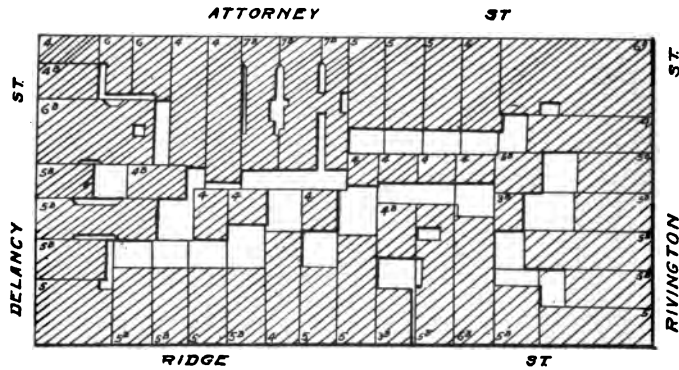
#### LIGHT AND AIR.

Plenty of light and fresh air are especially desirable in tenement houses on account of the class of occupants and the crowded conditions under which they live. The ideal conditions in this respect are only to be met with in a few buildings erected by individuals and by philanthropic societies. Due allowance being made for economy in planning, it should not be lost sight of that well lighted, cheerful apartments appeal to the better class of tenants, who can pay the best rents. A proper provision of light and air is therefore desirable for commercial as well as for social reasons.

The New York tenement house laws specify that all inner courts shall be provided with one or more horizontal intakes for air, consisting of passageways not less than three feet wide by seven feet high, which shall always be left open and which shall communicate directly with the street or yard.

#### FLOOR PLAN.

Especially in tenement houses compactness of planning and arrangement are greatly beneficial, the object being to supply the tenants with the maximum of comfortable and sanitary accommodation at the minimum rental necessary to make the investment commercially desirable.



A CONGESTED BLOCK, BUILT UP PREVIOUS TO LAW OF 1901.

Where there is no interference, the tendency in congested districts is to build over a far larger proportion of the land than is compatible with the best interests of either landlords or tenants. This typical block on the east side of New York City, built up almost entirely before the tenement house law of 1901, is covered to the extent of about 85%. Under the present law only 70% can be built on, except at corners.

Ground floor space, when it is not in demand for business purposes, is slightly less desirable than the floor immediately above, on account of its lesser privacy and its proximity to the noise and dust from the street.

There is, of course, considerable difference in the requirements for accommodation, running from the two-room tenement up to five and six-room tenements, which are really cheap flats, there being no exact dividing line between the tenement, the flat and the apartment house. In all of them unnecessary hall space should be eliminated, and in the cheaper tenements, where separate access from private halls to sleeping rooms is out of the question, they should open on to the main living room, and not be accessible only through each other.

Compact arrangement of rooms are great aids to economical planning, and it may frequently be desirable to furnish more than one flight of stairs in buildings on large plots.

Whatever the arrangement, each apartment should be

self-contained, so that when the door leading into the public hall is closed, the occupants can enjoy the fullest amount of privacy.

#### ECONOMY OF SERVICE.

Dumbwaiters are always provided in modern tenements, enabling the tenants to have their purchases delivered to them from the basement, without trouble to themselves. They also serve for the removal of the ashes and garbage to the street, from which they are taken away by the city scavengers. In the better class of tenements a common laundry is sometimes provided for the use of tenants. Provision has also to be made for drying the laundry. Central heating is rarely provided in the ordinary tenement, though the separate heating of apartments is one of the main causes of dirt. Arrangements have to be made therefore for the storage of coal as well as of food.

#### CONSTRUCTION.

The result of the tenement house laws is to restrict the height very generally to six stories.

Structurally they should be devoid of all unnecessary cheap ornamentation and of any material which will not stand rough usage. The building can be made attractive without employing the architectural embellishments so much in favor with speculative builders. Good brick and terra cotta properly used are more substantial and attractive than cheap stonework; galvanized iron cornices are objectionable, though their cheapness makes them attractive to builders. If they are not constantly painted they soon look shabby and detract from the value of the building. Simple and compact planning and avoidance of unnecessary offsets and angles in the walling tends to reduce the cost.

All plumbing and heating pipes should be easily in-

spected and cleaned, and all sanitary appliances simple in construction and free from complication. Much can be done in the interior finishing of these buildings to make them attractive and comfortable and yet to reduce to a minimum the work of keeping the rooms and passages clean. Mouldings should be simple and such as will not catch dust; rounded corners at the angles of rooms and at the junction of ceilings and walls should be employed, also cement floors to toilet rooms and passages.

## CHAPTER X.

### BUSINESS BUILDINGS.

Financial buildings—Banks—Entrance—Light and air—Floor plan—Construction—Decoration. Office buildings: Split stories—Entrance—Light and air—Floor plan—Economy of service—Construction—Decoration—Special office buildings.

**I**N the smaller cities, banks are generally housed in office buildings, of which they occupy the ground floor; the rest of the building, whether owned by the bank or not, being used for general office and other purposes.

The latest tendency even in central locations where land is high priced, is for the buildings owned by the wealthier banking corporations to be practically self-contained and for their own use only, thereby securing better light and ventilation and also because it is deemed best for them not to undertake the management of office premises larger than they require. There is, also, a considerable advertising value in the occupancy by strong financial corporations of distinctive and individual quarters.

#### ENTRANCE.

The entrance should be duly emphasized and brought into prominence without being obstructed by unnecessary columns or other impediments. The imposing effect which a long flight of outside steps is supposed to give a

building is obtained at the expense of discomfort to the users; utility and convenience in such cases should take precedence of decoration, and steps should be eliminated.

The excuse that by raising the ground floor it is possible to supply light to a basement story is inadequate, in that superior accommodation is thereby sacrificed to accommodation of an inferior order; these basement premises are always insufficiently supplied with natural light and when the windows are open they are receptacles for the dirt and dust of the street.

If the basement is required for storage vaults or similar purposes, it would be better to keep the ceiling at a lower level, so as not to interfere with the accessibility of the main floor, and to light and ventilate it artificially; office room for clerks would be better provided for in a mezzanine story above the banking room proper, from which it would be as easily reached as when placed in a basement. The number of entrances depends on the nature of the business transacted, one entrance giving better security, as it is easier to watch it and to scrutinize incomings and outgoings. Two or more entrances, especially when they are kept together, permit better circulation.

#### LIGHT AND AIR.

It is an easy matter to secure a proper amount of light and air by the use of glass domes or skylights supplied with proper ventilators, in addition to windows in the one or two-story buildings, now so much in use. Front and rear lighting from the street or yards and sidelighting is frequently done away with and top lighting only resorted to, the windowless facade carrying with it a suggestion of security in addition to the privacy which is thereby ensured.

The ideal building for very large institutions is that which is entirely self-contained, surrounded by streets on all sides, permitting freedom of inspection, even though



# POORLY PLANNED BANK ENTRANCES.

- (1) Doorways are found at the right and left after entering. This is apt to cause hesitation and confusion on busy days. Gates Avenue, Brooklyn.
- (2) Access is poor and floor space is wasted. Far better results would have been obtained by making entrance at or one step above sidewalk level. Fulton and Clinton Streets.



the frontages are not used for the purpose of obtaining light; such buildings are the Bank of England and the National City Bank of New York.

#### FLOOR PLAN.

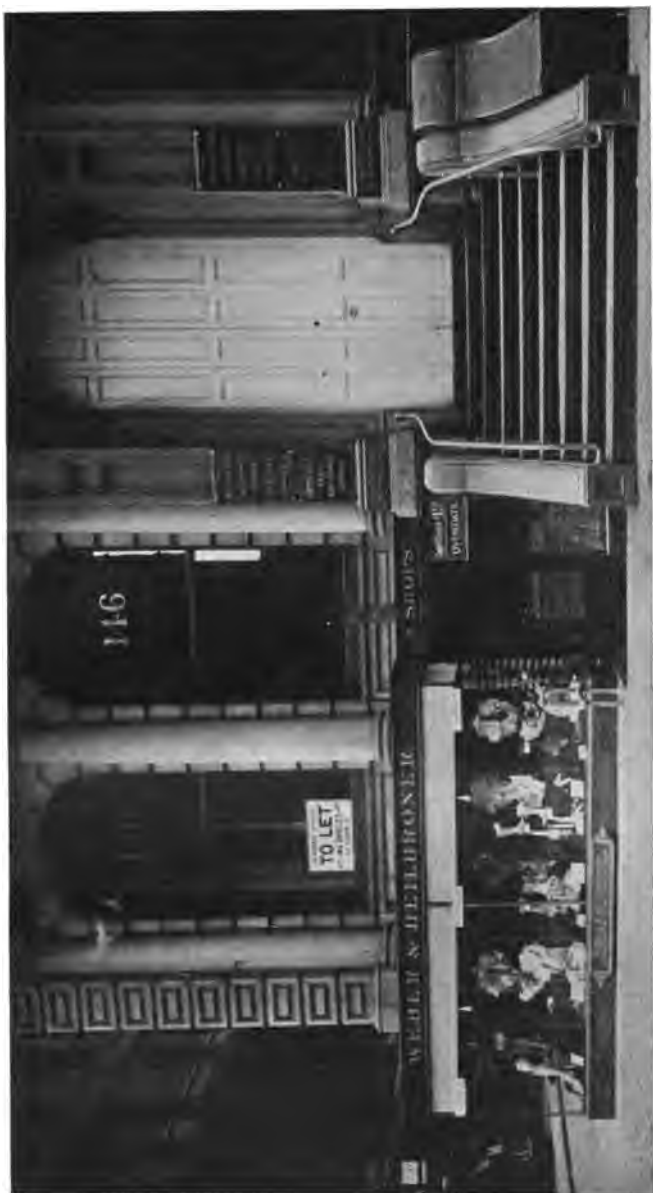
In this class of building, the ground floor accommodation is far more valuable than that on other floors and care should be taken, especially on high-priced land, to use it to the best advantage and chiefly for those departments whose duties require them to be in constant communication with the public.

Ample space should be allowed for the accommodation of the public and proper provision made for ease of circulation and for the separation of incoming and outgoing crowds, especially in savings banks and similar institutions, which are subject to periods of great activity at quarterly intervals.

Those departments with which the public transacts its business directly, such as paying and receiving tellers, should be placed where they are readily accessible and their quarters clearly indicated and easily seen on entering, thus avoiding delay and confusion; others, such as the general clerical force with which the public deals but occasionally, if at all, and which do not need constant communication with the more public departments, are best at a distance from the public spaces and placed where they will be quieter and suffer fewer interruptions.

When the business is complicated and departments of different requirements are to be accommodated, such as trust and bond or mortgage departments in connection with trust companies, these should be placed with reference to their relations with one another and with the general public.

The supervision of the working force by the proper officials and an outlook over the banking room in general by visitors and others is sometimes obtained by raising a



# EXAMPLE OF "SPLIT STORIES."

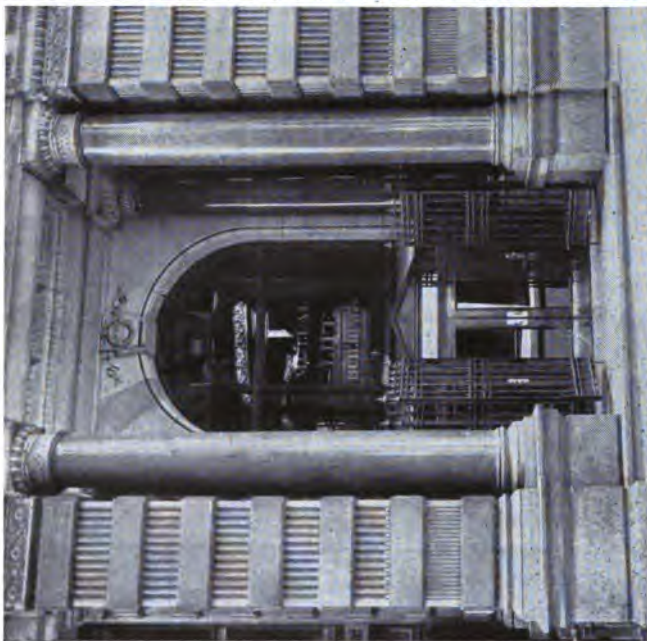
The "architectural" main floor of this building is vacant. The basement store, though a couple of steps below the sidewalk, is readily rented, after building out a show window to the sidewalk, completely concealing the supporting piers. Lower Broadway, New York.

portion of the floor above the general level, in other cases by the use of a mezzanine story from which it can be overlooked.

The accommodation required by the different officers depends for its location and distribution on the nature of the business transacted and their need of communication with the general public.

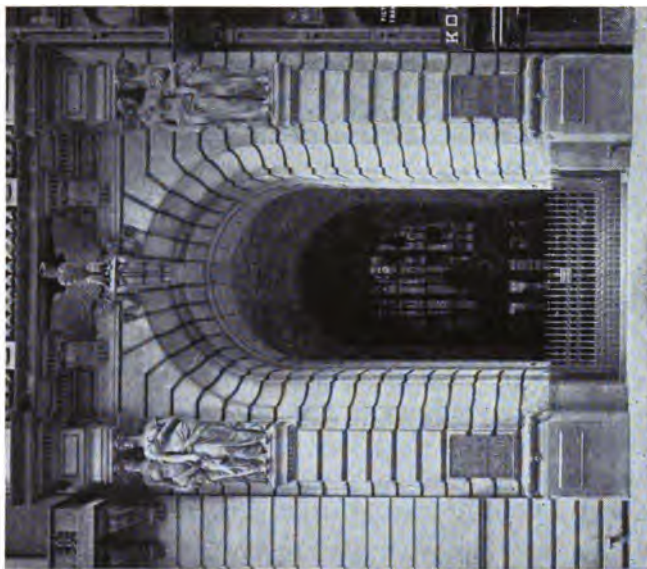
The requirements for cash and security vaults vary greatly. Sometimes it is considered advisable to have the entrance to these in plain view of the public, on account of the impression thereby supposed to be created; at other times they are out of view, and frequently, as with safe deposit departments on a separate floor, generally the basement. They should, however, be placed where they can be readily inspected and where incoming and outgoing customers are under full control.

On high-priced land, where the tendency is to erect buildings of numerous stories, a one or two-storied bank can be built in conjunction with the adjoining property and made to supply permanent light and air with beneficial results to all concerned. The bank can thereby secure its land at a lower rental in consideration of the open space above it which enables the adjoining buildings to cover a greater proportion of land than would otherwise be possible. (See R. M. Hurd's "Principles of City Land Values," and the frontispiece illustration of the Liberty National Bank in New York.) For further information concerning the planning of bank buildings, the reader is referred to an article by Philip Sawyer, published in the March issue of the Architectural Review for the year 1905, which contains much interesting matter as well as numerous examples.



A REMODELED ENTRANCE.

This entrance was originally designed with a long flight of steps constituting the sole approach to the main office of the occupant; on account of their great inconvenience, it was found necessary to remove them and to remodel the entrance, giving access to an elevator hall at the street level. Mutual Life Building, New York.



A GOOD GROUND-FLOOR ENTRANCE.

A good entrance to a large office building. The entire Broadway frontage of the City Investing Company's building is devoted, on the ground floor, to this entrance.

## CONSTRUCTION.

The construction should be fireproof in all important buildings. On account of the large floor spaces and open arrangement mostly adopted and the character of construction generally employed, non-combustible materials add but little proportionately to the cost.

All materials employed should be of the best, but a good quality of cheap material is preferable to a more showy material which will not last.

## DECORATION.

The exterior and interior decoration should be subdued and dignified; over-ornateness is not in keeping with this business, which demands a building expressing substantiality, restraint and judicious administration.

## OFFICE BUILDINGS.

The complexity of the problems presented by many of the high office buildings, which are being erected in such numbers in the larger cities, is such that it is only possible to deal briefly with the more general requirements which are to be met with; any more exhaustive inquiry would be beyond the scope of this book.

The purely commercial nature of most office buildings is such as to make a close study of their requirements of great importance. Though some office buildings are erected by large corporations for their own use, and as the visible and tangible expression of the wealth and solidity of their owners, these are somewhat of the nature of advertisements; most of them can be considered as purely commercial, and erected for the purpose of securing a suitable permanent return on the money invested.

The requirements of accommodation vary according to the probable uses of the building; in some the office units are large, some corporations needing large areas of undi-

vided floor space, easy of supervision and where the different members of the office force can be in constant communication with each other. In others the units are smaller and for occupancy by individuals or small firms. The size of the unit to be used depends on location, proposed tenancy and demand. Buildings of steel skeleton construction or those with self-sustaining walls and with floors supported by interior columns make possible numerous variations of the arrangement of the interior partitions and it is not infrequent in modern office buildings for whole floors to be offered to prospective tenants with the proviso that they will be subdivided to suit.

It is only in the larger cities that there is a purely financial section of any size, consequently in all others the ground floors of office buildings are generally used for banks, shops, etc. In the financial sections of the larger cities, the ground floor is of considerably greater rental value than the upper floors, due to its greater accessibility and prominence. Thus in the financial section of New York City, where the rentals of the upper floors range from \$4 per square foot per annum down to \$2, that of the ground floor will be about from \$10 to \$25, or over, or from five to six times as much as the floors above.

It is not necessary in buildings intended entirely for offices to use the ground floor for display as with store property; and direct access is needed only at the entrance or entrances.

#### SPLIT STORIES.

Before elevators came into general use, it was customary to build what are commonly called split stories, or high basement office buildings, the object being to secure ground floor rentals from two stories. This method provided a basement reached by steps, the floor of which was a few feet below the curb, and a main or ground

## THE COMMERCIAL PROBLEM IN BUILDINGS

floor from eight to fifteen steps above the sidewalk. There was some apparent justification for this type because it reduced the aggregate amount of inconvenience necessary in reaching these two stories and rentals were partly graded according to the ease of access of the different floors, being highest on the main floor and diminishing with each additional story in height. It is questionable, however, whether such an arrangement has ever been financially successful, as it meant the sacrificing of the most valuable floor space for inferior accommodation. Since the introduction and general adoption of the elevator, there has been no excuse for building in this fashion, though it is still occasionally done; it is uneconomical and results in a reduction of the ground floor rents which is not compensated by those obtained from the basement, the commercial value of the building being consequently diminished.

It is far better to recognize the ground floor as the actual main story in such buildings, making it as accessible as possible by placing it at or just above the curb level, giving it plenty of height, and emphasizing its importance by architectural treatment.

### THE ENTRANCE.

The large number of users and the aggregate inconvenience suffered by them when there is any interference or obstruction to its most convenient and ready use emphasizes the importance of a proper entrance to an office building.

A good example of an important entrance to a large office building is that of the City Investing Building in New York where the entire Broadway frontage is used for this purpose.

The public use of the main entrance is such that it

should be considered in a measure a continuation of the public highway and all impediments to traffic should be eliminated.

Where elevators are used they should be reached by the most direct and self-evident way and should not be at too great a distance from the entrance. Excepting sometimes the flight leading to the first floor, stairs in an elevator building are of secondary importance and are only used in cases of emergency, custom as well as objection to useless effort inducing every one to



**A POOR ENTRANCE TO A COMMERCIAL BUILDING.**

Valuable floor space sacrificed on first and second floors and ground floor; dark windows in recess on second floor; the flanking windows on either side of recess on second floor are inadequate. A poor front architecturally as well as commercially. Broadway, opposite City Hall Square, N. Y.



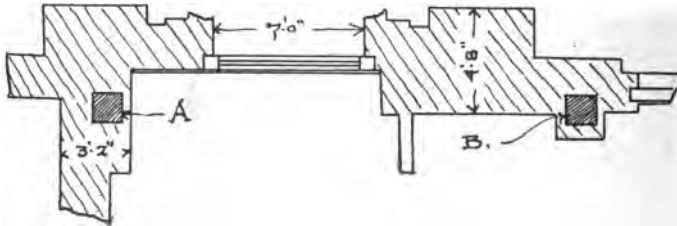
employ the easiest means of reaching his destination. In low buildings, however, where elevators are not used the position of the stairs should be plainly evident.

Elevators should be located not only with reference to the main entrance, but also to the offices on the different floors, the object being to place them where the sum of the distances from the elevator to the different offices plus twice the distance from the main entrance to the elevators will be as small as possible.

As there will sometimes be congestion in front of the elevator cages, there should be an additional space added to the width of the hall at that point, and especially when the hall continues beyond the elevator cages.

In modern office buildings of numerous stories, adequate elevator service is of great importance. Adequate service depends on the number, size and speed of cars used, and on the height of the building, and is regulated by the floor area served by each car and by the character of occupancy, some classes of tenants making greater use of elevators or having a larger number of visitors than others.

It has been found that after a building reaches a certain height, sometimes placed at from fifteen to seven-



#### ECONOMY OF CONSTRUCTION AND LIGHT SACRIFICED TO APPEARANCE.

The columns at A and B support the building. The thick walls and deep reveals are unnecessary and wasteful. Mutual Life Building, New York.

teen stories, it is necessary to provide express as well as local elevators, in order that the upper floors may not suffer from inadequate service.

It has also been stated that in office buildings the square feet of area per occupant varies from one hundred to one hundred and fifty, according to the nature of the occupation; and Mr. Reginald Pelham Bolton, who is authority for this statement, in his book entitled "Elevator Service," has drawn up a table showing the number of express and local cars needed in buildings of different heights, areas and of different intensities of occupancy.

In a paper read before the American Society of Mechanical Engineers at their meetings in May and June, 1904, Mr. Bolton stated that "a basis for the due proportioning of elevator service may be found in the provision of an elevator to an area of one thousand square feet of rented space repeated on sixteen floors," in other words, 16,000 square feet of floor area to each elevator. It has been found, however, that this proportion varies considerably according to the conditions met with in each case.

Some idea of the money value of accessibility and light may be gathered from the following example: In a prominent downtown Broadway office building the top floor is not reached by the elevator, which stops at the floor below. Moreover, the light in one room of a suite of four offices on this floor is insufficient, owing to the design of the facade. On account of the inconvenience of walking up one flight of stairs and the insufficient lighting of one-quarter of the space, the rent is 90 cents a square foot, whilst the floors below, down to the second floor, all rent for \$3 a square foot.

#### LIGHT AND AIR.

The provision of good light and air in high office buildings on expensive land is too frequently disregarded in the effort to utilize the land to the fullest possible extent, with

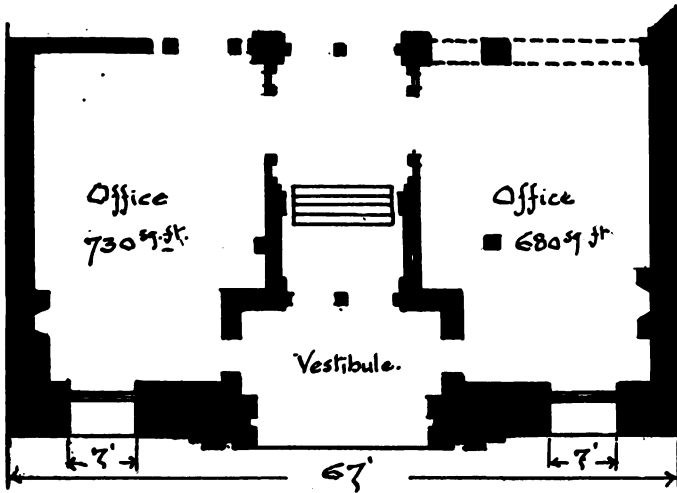


#### A POOR COMMERCIAL FRONT

This building shows a conflict between "decoration" or the desire to give an appearance of solidity to the lower story by means of heavy walls and piers and deep recesses, and "utility" or the need of show windows to obtain good rentals from valuable ground floor space. World Building, New York.

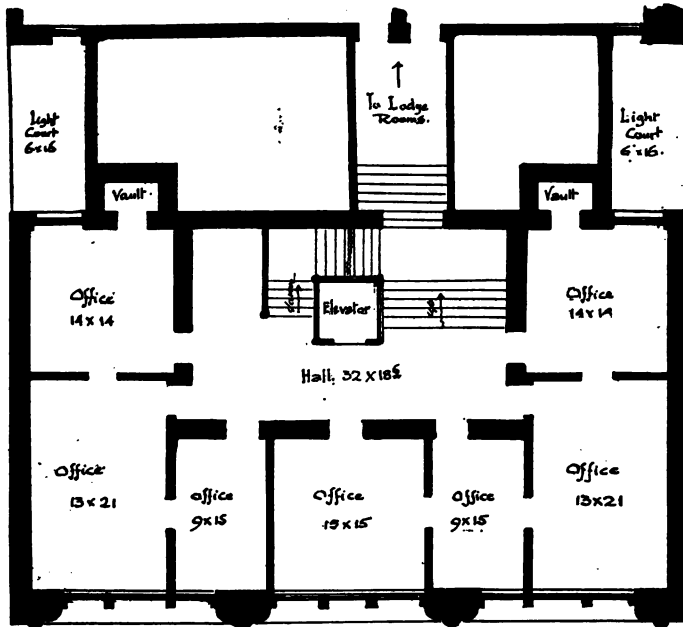
the result that great numbers of men are obliged to do clerical work almost entirely by the help of artificial light, this being detrimental to their general health and efficiency, as well as to their eyesight.

Natural light sufficient to work by will only penetrate a certain depth (from fifteen to twenty feet) and this should be the maximum depth of an office receiving light



#### FAULTY PLANNING AS TO LIGHT.

Fourteen feet only, seven to each window, of a total frontage of sixty-seven feet are allowed for lighting the most valuable floor space of this office building. The light is rendered more uncertain by the deep reveals. Manhattan Life Insurance Co.'s Building, Broadway, New York (before the erection of addition).



A WASTEFUL OFFICE PLAN.

Too large a hall. Rear offices insufficiently lighted. Office units rather poor. Insufficient utilization of main frontage; the three centrally located offices should have been deeper. Elevation evidently bears no relation to plan. Toledo, O.

from one side only, unless it can be augmented by the adoption of some system such as the Luxfer Prisms now used in many office and store buildings. There is also an indirect value in well-lighted offices, in their cheerful and prosperous appearance as compared with the depressing effect produced by dark rooms or those which have to depend on artificial light.

The fashion of simulating solid masonry construction in steel skeleton buildings has led to a large waste of space and sacrifice of light, by the supposed necessity of providing deep reveals to the windows, thus not only reducing the rentable area of the building, but withdrawing the

rooms from the full benefit of the light which they would have had if the windows had been placed nearer the exterior face of the wall. Office buildings should have their window area proportionate to the depth of the offices; steel skeleton construction permits of windows occupying a large proportion of the fronts, in fact all that part in width not taken up by the steel frame and its necessary protective envelope; this is especially the case in those portions of the building which receive light from courts. Where there is no necessity for increasing the width of piers and other masonry for architectural effect, it is also advantageous to have the windows recessed as little as possible.

Before sacrificing valuable ground floor space for the purpose of providing light to basements or inferior accommodation, it should be well to ascertain the comparative rentals of the space sacrificed and that benefited. The writer has in mind the plan of a building where about one thousand square feet of ground floor space with a rental value of \$3 per square foot per annum, or a total yearly rental of \$3,000 was sacrificed to obtain direct lighting to a basement, the rental value of which, even with the additional light thus obtained, was far inferior.

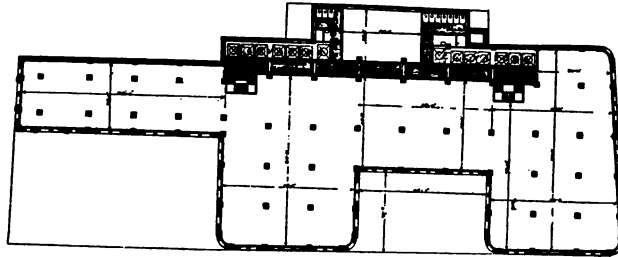
The surrounding walls of light courts should always be laid up in white brick, or at any rate painted a light color, the former being best, though the first cost is greater; a painted wall needing constant repainting.

#### FLOOR PLAN.

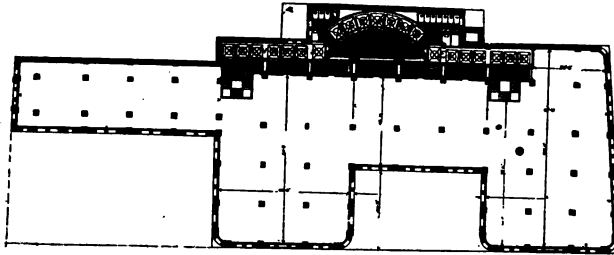
The purpose of an office building being to provide the maximum of rentable floor space, the most desirable units of size for the offices having been determined, the planner must adjust these as well as possible in the space at his command, making proper allowances for halls and corridors, toilets and other accessories, and also for stairways, elevator accommodation, and other



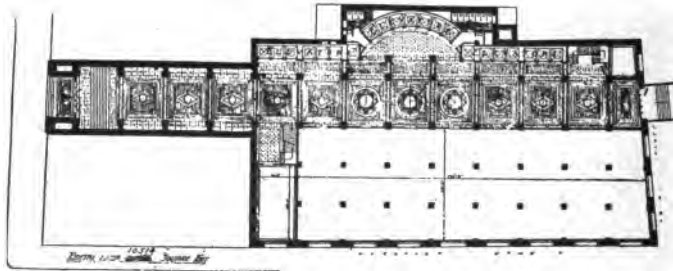
ARRANGEMENT OF ELEVATORS, 19TH TO 25TH FLOORS.



TYPICAL PLAN, 11TH TO 18TH FLOORS.



TYPICAL PLAN, 6TH TO 10TH FLOORS.



FIRST FLOOR.

TYPICAL FLOOR PLANS OF THE CITY INVESTING CO.'S BUILDING, NEW YORK CITY.

From the "American Architect."

adjuncts to proper service. It is better to sacrifice a possible additional increase in the office accommodation than to cramp some space utilized by all the tenants of the building, such as public corridors; or the more desirable offices, those for instance which have some additional advertising value as well as better light by reason of their fronting on a good street or which are most accessible from the elevators; these should be given the preference over offices in less desirable portions of the building.

The large modern office building demands a good deal of additional space for the accommodation of its heating and mechanical plant, which it is customary to place in the basement or sub-basement, these portions not being as valuable for other uses.

The average proportion of rentable area for floors above the ground floor, which can generally be obtained on corner lots, not exceeding thirty to forty feet in width, is after deducting walls, partitions, public passages and necessary light courts, from sixty to seventy per cent. of the total ground area; on interior lots it varies from forty-five to fifty-five per cent.

#### ECONOMY OF SERVICE.

In most buildings it is necessary to supply light and heat, and also to provide for the delivery of coal and goods and the removal of ashes and debris, and in buildings of five stories or over, and even where the floors are fewer in number, elevator service is generally supplied.

The cost of maintenance of the mechanical plant and the expenses of service in a building supplied with all the modern improvements are so great, being from thirty to forty per cent. of the total rental of the building, that it is as important to endeavor to secure economy of service as to provide the greatest possible degree of efficiency.





CITY INVESTING CO.'S BUILDING, BROADWAY NEAR CORT-  
LANDT ST., NEW YORK CITY.

The service with which the tenants of a high-class modern office building are generally supplied includes the following: steam heating (ventilating sometimes, but not often), hot and cold water, artificial lighting, elevator service, telephones, telegraph, mail chute and sometimes filtered and refrigerated drinking water.

Sometimes such buildings are provided with restaurants in the basement or on the roof, in which case proper provision has to be made for cooking in such a manner as not to cause any annoyance to the other tenants.

#### CONSTRUCTION.

In buildings of steel skeleton construction of average height, erected to meet the demand of the average office tenants, the framework of the structure should be that which will do the required work at the minimum expense, depending on the height of the building and the spacing of the columns; the exterior walling can be faced with expensive stonework or with cheap brick and terra cotta, and the floors and partitions can be of steel and terra cotta or of the cheaper concrete systems; the selection will depend on the individual judgment as to obtainable rents, on which should be based the proposed cost and consequent class of finish.

Sanitary appliances should be of sound manufacture and lasting qualities and the mechanical plant should be such as will render the most economical service during its life, which with most portions of the plant, may vary from five to twenty-five years, much shorter than the life of the structure proper.

In buildings of skeleton construction the flooring, doors, sash, trim, etc., or the so-called finish as distinguished from the structural portions and mechanical

plant, constitute such a small percentage of the total cost that it is unwise to use any but materials of good and lasting qualities for this purpose. In the smaller office buildings, in which the proportionate cost of finish to structure is greater, it is sometimes wise to finish the building more cheaply, in keeping with the lower rentals which it will command.

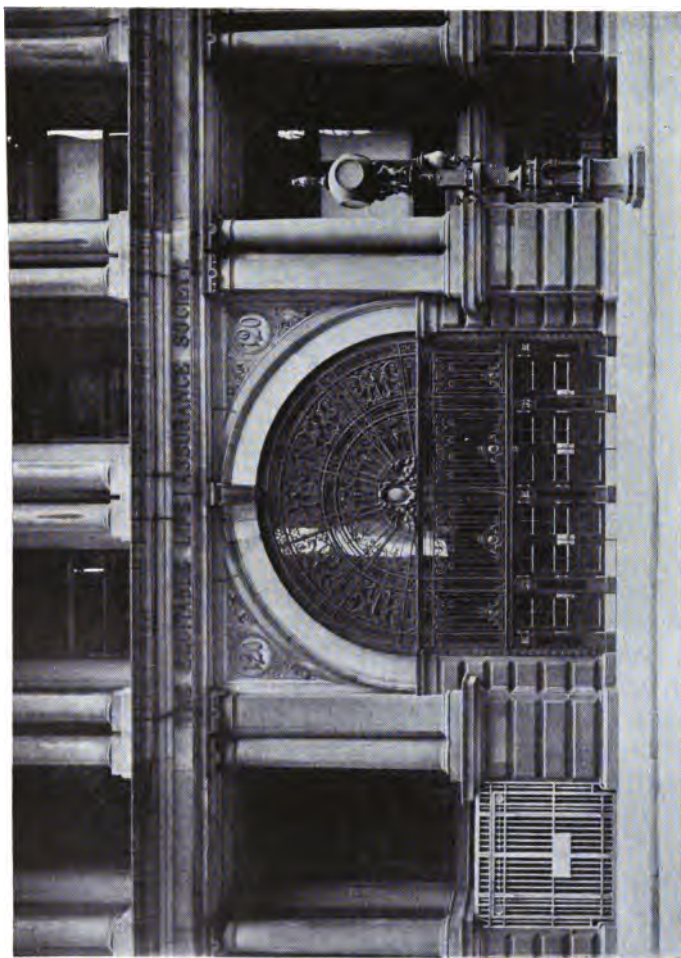
#### DECORATION.

The amount and elaborateness of the exterior and interior decoration is in the case of office buildings mainly a question of advertising. The building is well advertised and for that reason becomes somewhat more desirable to tenants, if it is of pleasing exterior and with well-designed and well-executed interior decorations which should be especially devoted to the most conspicuous portions, such as the main entrance and rooms for public use.

The judicious expenditure of a proper amount in the decoration of a building may be a good investment and aid in the securing and holding of tenants.

#### SPECIAL OFFICE BUILDINGS.

Special office buildings, such as are erected by large corporations for their own uses, are generally quite similar to other office buildings and are needed for the housing of their office forces, with, at times, special requirements to adapt them to their peculiar need, such as the large general offices of life insurance companies, the operating rooms of telegraph and telephone buildings, etc. These buildings are sometimes erected partly with a view to the advertisement obtained by their owners from their use and possession; this is, however, usually overdone from the commercial standpoint and it has been recently figured that the buildings erected by the leading New



**WASTEFUL DESIGNING FOR OFFICE-BUILDING FRONT.**

The massive construction and deep reveals in this building destructive of light and rentable accommodation. Ground floor accommodation of highest value sacrificed. Note the deep recesses and poor light to windows on each side of main entrance. Equitable Life Building, Broadway, New York, since destroyed by fire.

York life insurance companies have cost them far more than they could be sold for and that the return on the amount expended is far less than that earned from the most conservative investments.

Exchanges and similar buildings are of special character and requirements and are not in a sense commercial buildings.

## CHAPTER XI.

### SHOPS AND STORES.

Local shops—General stores—Department stores—Access—Display; show windows, straight front, recessed and projecting—Two storied show windows—Light and air—Floor plan—Construction—Decoration. Wholesale and commission buildings—Warehouses—Factories—Semi-public buildings—Transportation terminals—Churches—Clubs, theatres and concert halls—Hospitals, asylums and institutions—Schools, libraries and museums—Public buildings.

**I**N this country it has been customary to use the word store to designate a shop, as it would be called in England; there is a tendency, however, especially in the larger cities, to use both words and to differentiate between them by calling the more local and smaller establishments shops, those larger and less specialized, such as "department stores," being known as stores.

Local shops supply the needs of the people living in their immediate vicinity, and general shops or stores draw their trade from other parts of the city and sometimes from the surrounding country. The latter find their highest form of development in the type known as the "department store," almost always situated in the most active general shopping district and catering to the trade of the whole city in which it is situated, as well as to that of the smaller surrounding towns. Some shops have at the same time both local and general trade, and the aim of every local shopkeeper is to increase the num-

ber of his clients and to extend the territory from which he draws his customers. Many of the largest department stores have started as small local shops and have grown by extending their clientele and by absorbing adjacent buildings. An instance is that of the well-known London firm of "Whiteley's" which began in a small shop on the site which later became the center of the vast establishment doing business under that name.

In the smaller settlements, shops and stores are located on traffic streets running through residence sections; as they grow they tend to concentrate and eventually, in the large towns and cities, form separate sections.

In the small towns and villages, there is very little difference between the rental value of ground floor space and that of upper floors, just as there is but little increase in value of corners over inside lots. When cities become of great size, the excess value of ground floor accommodation in shopping sections over that of upper stories, due to accessibility for the sale of goods and the advertising value of the display in show windows is accompanied by a largely increased value of corners over inside lots, which reaches its highest point at the junction of two traffic streets, permitting ready access and a display of goods to the very largest possible number of transients.

Local shops which carry but small stocks of goods do not need great depth; thirty or forty feet would be about the average. When they become more general in character, the depth is increased until in department stores large areas are needed for the proper display of the numerous classes of goods dealt in.

The importance of the strength of the traffic in any neighborhood when the establishment of new shops is under consideration is evidenced by the custom of some merchants who have an enumeration made of the passers-



#### EXAMPLES OF POOR ACCESS.

- (1) On strong traffic streets buildings like this are poor income producers, on account of the poor access. The sign shows what alterations it has been found necessary to make, the principal one being the establishment of the store entrance at the sidewalk level.
- (2) The projecting entrance to this store and office building interferes with the access, light, and advertising value of the stores on either side of it.

East 23d St., New York, N. Y.  
Fulton St., Brooklyn, N. Y.



by before settling on any location and who also note the number of people who enter the premises occupied for businesses similar to that which they contemplate starting.

#### LOCAL SHOPS.

In the cheaper sections, local shops tend to be scattered throughout the district, especially at corners. Their existence is called for by the unwillingness or inability of the poorer people to go further than is necessary to make their purchases, which consist mainly of provisions of one kind or another, so that we see local shopping sections composed mainly of butchers, bakers, grocers, delicatessen shops, etc. The tendency for these shops is to gradually group themselves on the streets and at the corners which are to be found within the easiest reach of the largest numbers. As a section grows in population, the best shopping street in it attracts an increasing number of purchasers and the shops gradually enlarge their stocks of goods and their facilities, the street tending to become a general shopping street. Eventually, if able to attract a sufficient number of customers, this street may become suitable for the establishment of department stores. A good example of a street running through all these changes is 125th street, New York, which, originally supplying merely a small local section, has become the main trade centre for a large portion of the upper city.

The requirements of shops and stores are very similar, varying only in their intensity. Thus the necessity of climbing three or four steps to reach a small local shop would detract slightly from its value, but in a high class shopping section, this lack of accessibility would result in a greatly decreased rental and would render it less desirable than neighboring shops entered at the level of the curb.

## GENERAL STORES—DEPARTMENT STORES.

The main difference between a local shop and a general store (between which there is no actual line of demarcation) is the character of the business carried on. In the former, the purchasing is done in person and the goods are frequently carried away by the purchasers. In the latter it will be found necessary to deliver to the homes of the purchasers a large part of the goods sold. Orders will frequently be by telephone or mail; everything will be done on a larger scale. It will, therefore, be necessary to provide ample facilities for the receiving, storage and distribution of goods. In large stores, either a side street or a private passage way in the building itself may be used for this purpose.

The department store, of which the first in New York City was built by A. T. Stewart, at the corner of Broadway and Chambers street in 1848, has special requirements by reason of its size, the number of its customers and employees, and the numerous different classes of goods dealt in.

The principal requirement, subject to its being readily accessible, is the largest possible unrestricted floor area. This is due to the impracticability of exceeding a certain number of stories in such buildings, owing to the increased expense for elevator service and the inconvenience to customers. In an article entitled "All Kinds of a Store" referring to Macy's, in its issue of August, 1902, the "Architectural Record" has the following: "The consequence is that a department store is limited in height. Unlike an office building it cannot be profitably built higher than a comparatively low number of stories and it is probable that the nine stories of the new Macy building represented, under present circumstances, the limit of useful and profitable height. The primary re-

quirement of a department store building may consequently be defined as the largest possible floor space confined to the fewest possible stories."

Other requirements call for the greatest possible amount of natural light; hence the largest department stores are built occupying whole blocks, drawing light from the streets on all frontages; ease of communication between floors by means of passenger elevators, escalators, stairways; large aisles for circulation between counters; protection against fire, the consequences of which would be serious when the large area and the number of persons exposed is taken into consideration.

After the customers, employees have to be taken care of and proper facilities provided to ensure their comfort and efficiency.

The article quoted above gives some figures which may be of interest in this connection: "The Macy building has nine floors above ground, two below, each floor containing about 70,000 square feet; the number of customers runs from 25,000 to 40,000 a day. There are sixteen passenger elevators, twelve for customers and four for employees, two elevators for furniture and three for general freight. The employees in the busiest seasons amount to about 4,000, and three thousand horsepower are developed by the engines."

#### ACCESS.

It is important that all shops be easily accessible to intending purchasers, and the presence of steps or obstructions at their entrances is injurious; one or two descending steps, however, are less objectionable than when they ascend, but an entrance on the same level or but slightly above the sidewalk is preferable in all cases. The necessity for ease of access extends also to the sidewalks in front of shops; obstacles such as sidewalk lights



A GOOD COMMERCIAL SHOW WINDOW.

Allows a large number of small articles to be displayed. The plate glass is curved at entrances. Fulton St., Brooklyn, N. Y.

set in projecting frames, trap doors leading to cellars, sidewalk elevators, etc., cause passing people to turn aside to avoid them and prevent them from examining closely the goods displayed for sale in these windows. The position of the entrance should be plainly evident; one of ample size will be sufficient in the smaller shops, where there is not great activity. Where the traffic is greater, two at least should be supplied, one for incoming, the other for outgoing customers, and a vestibule or recess should be provided to prevent overcrowding. The use of revolving doors where there is much traffic is open to the objection that they admit only a single file at a time, also that they are apt to cause confusion when used by those unaccustomed to them.

Facilities should be provided, after entering, for a proper circulation between the counters, permitting the fullest inspection of the goods offered for sale. On corners, especially at the intersection of active streets, the position of the entrance should be carefully studied. If one street has more strength than the other, the entrance should be reached from it; if the streets are of equal strength, a corner entrance would be advisable.

#### DISPLAY.

The importance of adequate show windows to shop fronts for the proper display and advertisement of goods for sale, cannot be too much insisted on. Also that there is some variation in this respect in the requirements of different businesses.

The great importance which the advertising value of the show window assumes from the standpoint of the shopkeeper is evidenced by the fact that in many large stores this will be enclosed, backed with mirrors to reflect goods exhibited and will thus admit no natural light to the interior of the store, which will depend entirely on artificial lighting.



A GOOD COMMERCIAL STORE FRONT.  
Gives an uninterrupted stretch of display window, a good entrance at the sidewalk level, and plenty of light.  
West 23d St., New York, N. Y.



A GOOD STORE FRONT.

Easy of access, well lighted, and affording an attractive framing for the goods on display. Paris, France.

There are three distinct types of show windows: 1st, straight fronts; 2nd, recessed; 3rd, projecting. (See "English Shop Fronts, Old and New," by Dan and Willmoth.)

*Straight front show windows*, generally placed at, or slightly back of, the building line afford good light and bring the goods displayed well within the view of the passing public; on account of their cheaper cost and the desire to obtain unbroken spaces for display they are the common type and most in use.

*Recessed fronts* may be entirely or partly recessed, affording an additional amount of show window, better access and standing room for inspection; the light is not as good as in straight fronts but with some goods, which are damaged by exposure to too much light, this may be an advantage. Sometimes it is deemed advisable to

recess the entire front, or to form a passage way to the store, lined on both sides with show windows, sacrificing the necessary floor space for the sake of the extra display; this may be advantageous in some cases, where the street traffic is heavy.

*Colonnades.*—A natural development of the recessed store is the continuous colonnade, either carried over the sidewalk, where municipal laws allow it, as in the Rue de Rivoli, Paris, or providing an additional passage alongside the sidewalk; see "English Shop Fronts," which states further: "The loss of light occasioned by the shadowing of piers and arches must be considered in a possible adoption of this idea. A reference to an illustration of Regent street before 1848 shows this noble thoroughfare with a colonnade extending the whole of its length. This was done away with because of the great loss of light occasioned by the columns," and further "It might be desirable to take this gallery or colonnade up two stories and to adopt the idea contained in the success of the old Chester Rows. An attempt was made in Shaftesbury Ave., London, to give definite form to such a suggestion. Two stories of shop fronts with stairs leading from the streets at various intervals were erected upon a triangular site. For some reason or other, the scheme, however, was not a financial success.

*Arcades.*—A still further extension of the recessed shop front is to be found in the "arcades" such as the well known Burlington Arcade in London, and the Victor Emmanuel Arcade in Milan.

The difference between a colonnade and an arcade is that the former has shops on one side only, generally parallels traffic streets and is frequently surmounted by the main body of the building; arcades have shops on both sides, form thoroughfares connecting traffic streets, and are really narrow streets covered by glass roofs.





**A POOR FRONT COMMERCIALY.**

An extended display is secured at the expense of floor space and loss of light under archway. Chestnut St., Philadelphia, Pa.

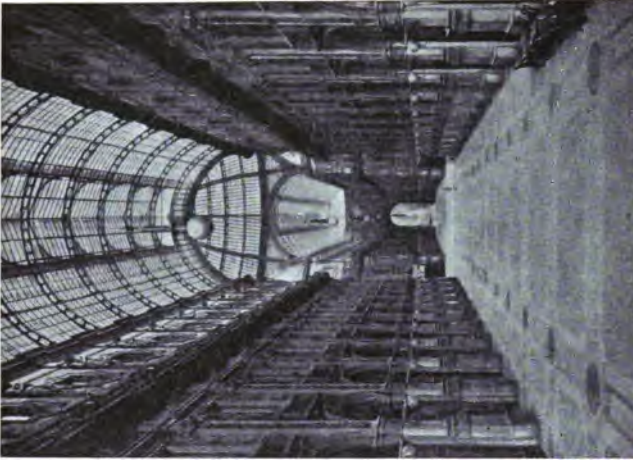
*Projecting fronts* give plenty of light and carry the display as near as possible to passers on the sidewalk; inspection of their contents, however, may cause interference with the passing traffic, if heavy.

The type of show window which will give most satisfaction depends on the character of goods to be exhibited, the depth of show case needed and the intensity of the passing foot traffic; the glass in most of them, however, should be carried as near the ground as possible, better inspection being thereby ensured. Some goods, costly, but of small bulk, such as jewelry, art goods, millinery, need but a shallow case for display. Hardware, clothes, dresses, etc., require a good deal of depth; carriages, automobiles, furniture, pianos, frequently have no enclosed show windows, but are placed on the main floor close to the windows, where they can be viewed from the outside.

Some businesses, such as restaurants, cafes, confectioners, especially of high class, need no show window for display but a distinctive front to advertise them and attract customers; in these the glass is better not carried too low; more privacy and better results are obtained by keeping it at a sufficient height. Stores having numerous branches frequently adopt either a distinctive front, as has been done by the Jaeger Wool Company in London (see "English Shop Fronts, Old and New") or a system of signs and uniform coloring which answer the same purpose without being so costly; thus, the red color adopted for the shop fronts of the Woolworth Company's numerous stores; also the uniformity of signs and coloring of the United Cigar Stores Company. The practice of having butchers', fishmongers' and grocers' shops open to the outer air is objectionable, unless the objects for sale are sheltered from dust and other impurities.

*Two-storied Show Windows.*—Two-storied show windows are out of place except on very active streets, such as upper Fifth Avenue, New York, or where they have the advantage of being overlooked from an elevation, such as the station of an elevated railroad. They may be connected with the main design of the shop front and form an entresol, or may be treated as entirely separate floors. They are best used for displaying goods of large bulk or striking appearance, which will attract and be seen from a distance. The attempt sometimes made on a small traffic street to earn ground floor rentals from two stories is mostly futile, especially when the ground floor proper is placed below the sidewalk level in order to reduce the number of steps necessary to reach the upper floor. They are liable to remain untenanted or at best to rent for less than accommodation better suited to the neighborhood would have done; in times of commercial depression they are nearly always vacated before ground floor shops.

Basement shops are available on traffic streets for businesses which cannot pay ground floor rents, but need proximity to main lines of travel. They are frequently used under tenement houses in congested sections, but though economical, are undesirable, having poor access, poor light and becoming receptacles for the dirt of the street. When reached from the interior of large stores by means of elevators or other convenient forms of access, they furnish cheap accommodation for bulky goods which can be properly inspected by artificial light; some parts, moreover, near the outer walls, can be rendered quite light by means of Luxfer prisms and sidewalk lights. Luxfer prisms have been of great assistance in lighting the interiors of deep stores; they are used to great advantage above the line of the show window



THE VICTOR EMMANUEL "ARCADE," MILAN, ITALY.

From the "Architectural Record."

proper, which need not be carried to the ceiling; also at the backs of stores and in other places formerly not reached by the light from windows or skylights.

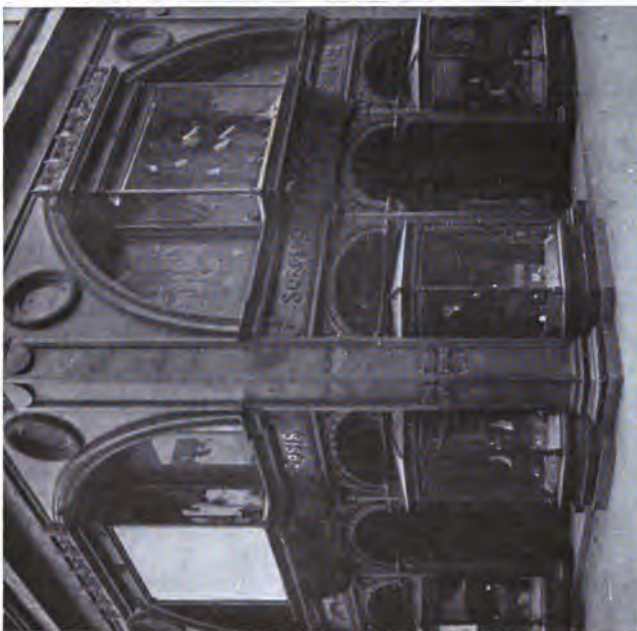
The modern tendency has been to make a great use of plate glass in as large sheets as possible; this has been overdone and better decorative effects could frequently be obtained by the use of smaller panels and the exercise of some ingenuity in the design of the setting.

The use of convex or bent glass is injurious in some cases, certain classes of goods being distorted in appearance when seen through it.

It is possible to design shop fronts which are indicative of the business carried on, and they are well worth the study they entail, especially in costly buildings. Architects would frequently obtain more satisfactory results in the lower stories of buildings they design if they would recognize the urgency of a commercial front and realize that the space used for unnecessary supports represents to the tenant so much advertising accommodation wasted and which he will immediately proceed to cover with plate glass and show cases. Much remains to be done in the design of distinctive shop fronts and attractive signs. Where the premises are owned by their occupants the objection of the lack of convertibility for tenancies of different character is removed and it would seem as if, with iron construction, a framework could be supplied on which the decorative features characterizing the nature of the business could be varied at will.

The attraction of a good shop front can be enhanced by well-designed artificial lighting, the advertising value of which is recognized by many shopkeepers located on active streets, who keep their premises illuminated in the evenings, though the shops themselves may be closed.

The following extract from London "Truth" issued



# GOOD COMMERCIAL SHOW FRONTS.

- (1) The projecting show cases are very suitable for the display of small articles, in this case shoes. Fulton St., Brooklyn, N. Y.
- (2) Forms an artistic framework for display of goods. The canopy serves to project light into the interior of the store. Heavy projection above mezzanine story interferes with light and is not so satisfactory. 5th Ave., New York, N. Y.

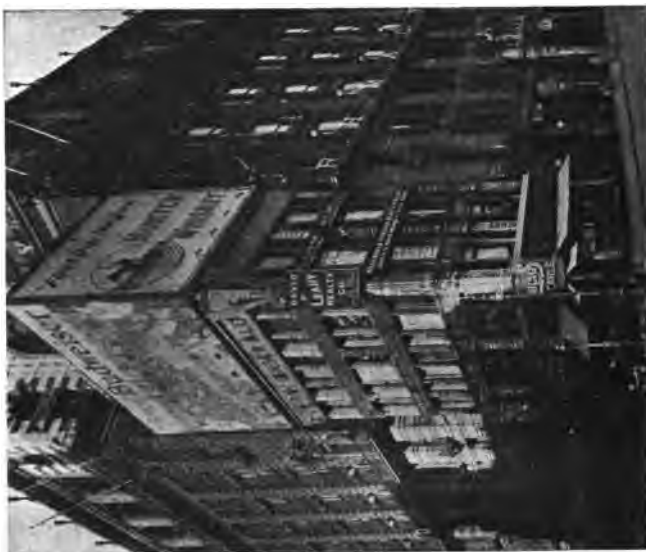
May 1, 1907, is interesting in its reference to the design of shop fronts:

"The protest of the Regent street shopkeepers against the rebuilding of the Quadrant has a good deal of reason in it. A shop front of the most approved modern type may not be a beautiful architectural feature, but it has a well-defined value as a commercial asset, especially in a thoroughfare which is essentially a promenade of people more or less bent on shopping. For a firm which has built up a large trade in such a thoroughfare, largely on the strength of its windows, it is a very serious matter to be suddenly reduced to the window space provided by Mr. Norman Shaw's design—not only a very limited space, but recessed between heavy piers of masonry, so that the contents of the window are only displayed to a person standing immediately in front, and if loss of trade is threatened by this alteration of the frontage, the Crown, as the ground landlord, as well as its tenants and sub-tenants, will suffer in the long run, though it may not do so immediately."

#### LIGHT AND AIR.

The question of adequate light has been dealt with under the head of show windows, which serve not only to display the goods for sale, but also to supply needed natural light; when this is insufficient, artificial light (usually electric) must be supplied; unfortunately for the purchaser, many goods look very different when seen under artificial light than they do by natural daylight.

In the larger stores especially, owing to the great number of people visiting them, there is need of an adequate system of ventilation, and in this connection it may be mentioned that on account of the condensation which occurs at the show windows in winter time, they need ventilation in order to prevent the goods displayed from being hidden from view by the glass becoming blurred.



- (1) TWO STORIED STORES. Undesirable and hard to rent except on very strong traffic streets. Of these seven buildings all but one of the upper stories are vacant. The basement stores, though several steps below the sidewalk, are all rented. Bedford Ave., Brooklyn, N. Y.
- (2) A GOOD EXAMPLE OF ROOF ADVERTISING. Signs cover and conceal all the architectural features in the building. Broadway and 34th St., New York.



## FLOOR PLAN.

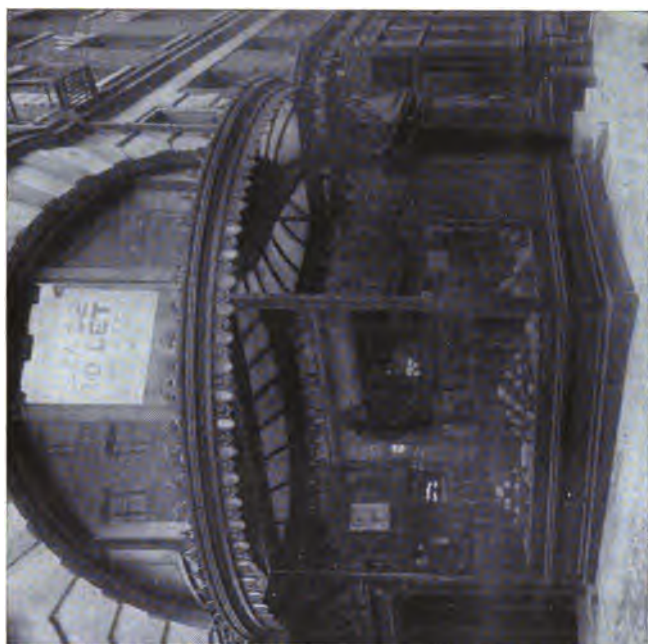
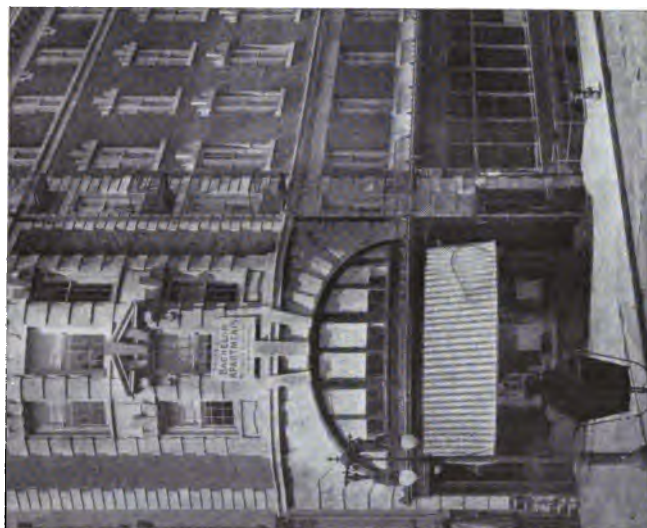
The arrangement of the floor space depends on the class of goods for sale and resolves itself mainly into the disposition of the counters and the provision of aisles for free circulation, except that in the larger stores offices have to be provided for the management and for clerks.

In department stores, apart from the main selling space, there are numerous offices needed for clerks, special show rooms for certain classes of goods, conveniences for customers, in some cases dining rooms for visitors and for employees; and the planning of a large department store, on account of the many and various requirements, calls for a great deal of ingenuity and numerous compromises.

## CONSTRUCTION AND DECORATION.

The material used in the construction of the larger shops should be selected with a view to their lasting qualities, especially where they are subjected to heavy use. The larger stores certainly, should be of fireproof construction, both on account of the great number of people to be found in them during business hours, the difficulty of isolating a fire once started, and the large and valuable stock of goods exposed on the counters. The large open spaces provided and the generally open character of construction is such that the additional expense is slight and is largely offset by the saving in cost of insurance.

The necessity of a more artistic treatment of shop fronts has already been commented on. Department stores especially, on account of their large areas, cost and general prominence, are particularly subjects for individual design. The first two stories of the Schlesinger & Mayer department store building in Chicago, designed by Mr. Louis H. Sullivan, give a good example of a well carried out and commercially satisfactory show window frontage, which is of itself a good advertisement of the business carried on.



# EVOLUTION OF A CORNER DISPLAY WINDOW.

- (1) By rounding off the corner of this building valuable space on the ground floor as well as on the upper floors has been wasted.
- (2) Shows how this defect has been remedied by remodeling the store front. Fifth Ave. and 38th St., New York, N. Y.

**WHOLESALE AND COMMISSION BUILDINGS.**

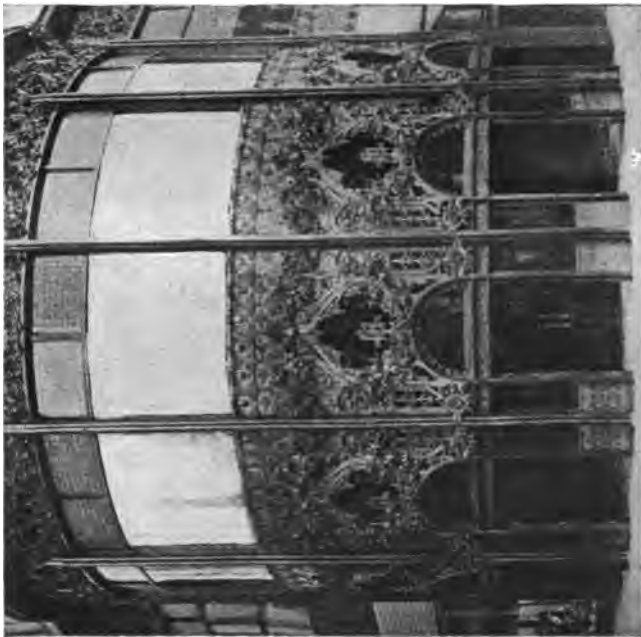
Shops and stores exhibit in their show windows and on their counters the articles which they have for sale and which are purchased by customers and carried away or forwarded to them. The object of the display is not only to cater to a demand which exists, but to endeavor to create the demand by arousing a desire for the articles shown.

In wholesale and commission buildings samples are exhibited from which the purchaser, generally the retailer, selects the class of goods he desires, the goods themselves being stored either in the building itself, in warehouses or at the factory. In some cases the samples are merely specimens of goods which are only manufactured to order.

There is, therefore, not the same necessity in this class of buildings to make a display for the purpose of attracting purchasers, and many of them have no show windows, but display the goods on counters to the customer after he has entered the premises. Frontage on a traffic street is therefore not of first importance; accessibility of location, proximity of similar businesses and a sufficiency of floor space for counters, and in some cases for storage, are the essentials.

On account of its greater accessibility, ground floor space is somewhat more valuable than upper floors, though the disproportion is not as great as with shops and stores. Corner lots are more valuable than inside lots, but here again the difference is not as great as with shops. The portions of the building needed for the display of goods or for office purposes require light; but those used for storage can do with very little of it, hence in sections closely built up the whole of the land will generally be built over unless the building laws prevent.

An important requirement of this class is that of con-



#### EXAMPLES OF DEPARTMENT STORE FRONTS.

- (1) A good department store entrance. The five doorways permit separation of incoming and outgoing crowds, no steps.
- (2) A good show front to a department store. Plenty of display space, good light carried to interior of store by prismatic glass over display space. Decoration of structural parts a good frame for display. Schlesinger & Mayer Building, Chicago. Louis H. Sullivan, Architect. From "Architectural Record."

venience for the handling of goods, both receiving and shipping, hence property fronting on a good street and running through to an inferior street or an alleyway is especially desirable; as instances can be cited, in New York City, Broadway lots above Canal street, running through to Crosby street on the east and to Mercer street on the west.

The planning of these buildings is frequently a simple matter, as they are mostly divided into lofts, which are large open spaces, clear of partitions, containing merely the necessary columns to support the upper floors. When the buildings are narrow, columns are unnecessary, the floor beams being carried on the side walls. All wholesale and commission buildings are, of course, not so simple in plan, as provision sometimes has to be made for the office force and in some cases for special show rooms.

It has already been stated that in order to facilitate the delivery and shipping of goods, a double frontage is beneficial; where this is not to be had, this work has to be done at the main frontage; in this case either a platform or an entrance at the level of the main floor is provided and is frequently placed at the height of a delivery wagon to facilitate loading and unloading. In the larger buildings wagons can be driven into interior courts or passages at the street level and discharged under cover. In wholesale sections tenants of buildings sometimes have the right to use the sidewalk for deliveries, wagons being backed up to the building itself.

The construction of this class of building should be plain and serviceable, the floors sometimes requiring sufficient strength to carry heavy weights, as with some classes of hardware, crockery, etc. Where the stocks carried are costly, fireproof construction should be employed.

Freight elevators of sufficient size and power for carrying goods from one floor to another, and sidewalk lifts to reach the basement and cellars, are generally provided.

#### WAREHOUSES.

Warehouses are buildings for the storage of goods; their principal requirements are accessibility to transportation, easy grades and well-paved streets for hauling goods, sufficiency of floor space of the requisite strength, and in some cases proximity to their customers.

Storage sections are generally to be found on low-lying land, not far from docks or freight terminals. Corners have but slightly more value than inside lots, especially when used for purposes needing no light, economy of delivery and shipping and greater accessibility being the reason for some added value. Ground floor rents are somewhat greater than those of upper floors on account of greater accessibility. Light is very seldom important in warehouses and in some cases is detrimental. The building frequently covers the entire land, no light courts being necessary.

Cold storage warehouses located near commission sections and used for the storage and preservation of provisions at low temperatures require elaborate refrigerating plants in addition to insulated floors, ceilings and partitions, dividing the building into the requisite number of apartments.

Warehouses for the storage of household goods may be located conveniently to well built up residence sections; as in all buildings for the storage of goods, economy of service in the receiving and shipping of goods are essentials and proper service entrances and driveways, freight elevators, and other aids to efficient service should be provided. Freight elevators in the newer storage warehouses frequently deliver a wagon load of goods on any floor of the building.

The added cost of building of fire-resisting materials is not great in this class, especially where the floors have to carry heavy weights; and fireproof buildings will generally be found commercially beneficial on account of the greatly increased fire hazard and consequent high insurance rates in buildings of ordinary construction.

#### FACTORIES.

Factories require the largest possible accommodation properly lighted, at the minimum cost. They are generally built on low-lying land, accessible to railway or steamship transportation.

Where land is sufficiently cheap, it has been found advantageous to restrict the number of stories as much as possible, buildings of more than one story in height requiring expensive foundations to offset vibration and to support the weight of heavy machinery.

In cities the cost of land frequently necessitates buildings as high as five or six stories, and for the manufacture of articles of small bulk even higher buildings are used, especially when, as with the manufacture of jewelry, milliners' goods, etc., proximity to the shopping sections is found necessary.

With cheap factory land, corners are of practically the same value as inside plots, top lighting being sometimes preferable to side lighting. In the more closely built-up sections, especially where high buildings can be used, corner lots are of considerably more value than inside lots, the additional value being due to better light and greater accessibility for the delivery and shipment of goods. The principal requirements called for in the manufacture of the different classes of goods vary so much with the goods themselves that it is useless to attempt any mention of them here except to say that the varied construction required to house the different forms of machinery used tends to make any factory building

unsuited to other purposes than those for which it is constructed. This objection is to some extent eliminated in factory buildings suitable to the lighter forms of manufacturing, where the main requirements are floor accommodation and light.

#### SEMI-PUBLIC BUILDINGS.

The requirements of semi-public buildings are rather utilitarian than commercial; but few of this class are erected with a view to earning a direct rental. Their requirements vary greatly with their different uses and may be briefly outlined as follows:

#### TRANSPORTATION TERMINALS.

Transportation terminals are mainly used for the purpose of receiving and distributing either passengers or freight and for the accommodation of the necessary officials and employees connected with the physical management of the train or steamship service and its attendant occupations. The largest terminals, especially those connected with steam railroads, frequently contain hotel accommodation, restaurants, telephone and telegraph offices and various other secondary provisions for the accommodation of their patrons or the use of their employees.

The principal requirements of terminals proper are sufficient accommodation for the trains or steamships entering them; proper and sufficient access to and from the various parts of the building permitting the separation of incoming and outgoing passengers, allowance being made for the nature and intensity of the traffic which has to be handled; and waiting rooms of sufficient size and adequately lighted to accommodate passengers and so placed that there will be a minimum of trouble in reaching trains or boats.

Secondary accommodation, such as ticket offices, information bureaus, stationery stands, etc., and, where



necessary, proper facilities for receiving and shipping, with a minimum of handling, either passengers' baggage or freight of all kinds, where the terminal is for that purpose. Patient study is needed to provide for properly handling large numbers of people, moving mostly in regular order, and frequently in opposite directions; where they are not properly separated and their direction plainly indicated, the utmost confusion is apt to prevail.

#### CHURCHES.

Churches are buildings for the assembling of men and women for the purpose of religious worship. Their requirements are educational as well as utilitarian. As in all buildings where numerous people are at one time either entering or leaving, freedom of movement should be facilitated in every way, thus: Entrances of proper size, sufficiently numerous, and aisles or passageways of adequate width.

As some portion of the service generally consists of sermons, lectures, or the reading of prayers, a church should have proper acoustic qualities and the seats should be so placed that all members of the congregation shall be able to see and to hear clearly whoever is acting as teacher or preacher.

Heating and ventilating are necessities too frequently neglected, and many a person has suffered from draughty, poorly ventilated and badly heated churches.

Churches, on account of their educational influence, lend themselves particularly to proper architectural treatment; their general form is in many cases established by prescription or by the character of the service of the particular denomination for which they are erected.

In cathedral churches, on account of their monumental character, it is almost impossible to bring all the congregation within reach of the preacher; moreover, their

function is somewhat different from that of ordinary churches and they are more particularly devoted to special religious ceremonies and festivals.

#### CLUBS.

These would include social clubs, as well as those for Young Men's Christian and other associations, professional clubs for engineers, architects; historical, geographical or musical societies, etc.

In these the requirements vary greatly with the uses to which the buildings are to be put; in some the social features are predominant and provision must be made for entertainments of all kinds as well as for the convenience and comfort of the members; in others, such as those for the use of societies, educational requirements prevail; some are for constant use, others principally for gatherings on special occasions.

#### THEATRES AND CONCERT HALLS.

In theatres and concert halls one of the most important requirements is that ample provision be made to allow the greatest number of people the building can contain to leave rapidly in case of need; this implies not only a sufficient number of entrances and exits conveniently located and of ample size, but that they shall lead to open spaces of sufficient size to enable those who have left the building from hindering those who follow; also that the interior of the building, and especially portions devoted to the seating of guests and to the actors and musicians, be supplied with a sufficiency of aisles and passageways leading as directly as possible to doors which will readily open towards the exterior of the buildings and the position of which is plainly evident.

All such buildings of any size should be fireproof, though this alone will be insufficient in case of fire or panic, as they always contain a sufficient amount of in-

flammable material to create a great deal of smoke, and fewer lives are generally lost by reason of the fire itself than by asphyxiation or by being crushed to death in the panic which is almost certain to follow any alarm of fire.

Other requirements are a main hall of good acoustic qualities, properly heated and ventilated, provided with seats from every one of which a view of the stage or platform can be had, a stage or platform of adequate size which will depend on its proposed uses, proper dressing and retiring rooms for the performers, and refreshment, lounging and dressing rooms for the guests.

#### HOSPITALS, ASYLUMS AND INSTITUTIONS.

The requirements in these buildings vary greatly with their uses, depending whether they are public or private in character, for general or special treatments, and also on their location.

Nearly all of them contain dormitories for the use of patients, operating rooms, residential quarters for the staff and various other accommodations.

The principal requirements of such buildings are light and ventilation, all possible aids to cleanliness and efficient service, and in some cases orientation. In residential institutions the same requirements exist as in collective residences, except that in most cases the inmates require a certain amount of supervision, and the collective principle is carried to a greater extent, in that they frequently use common dining and living halls and dormitories.

#### SCHOOLS.

Schools, like theatres and music halls, should be carefully safeguarded against danger from panic in case of fire and entrances should be numerous and easily accessible from all parts of the building. Ample light and air



#### CHANGES OF UTILIZATION

- (1) Old Federal Hall, now used for Sub-Treasury. Wall, Nassau and Pine Sts., New York, N. Y.
- (2) High-stoop residences, reconstructed for shops. Court St., Brooklyn, N. Y.

and proper ventilation are essentials; orientation for some rooms is beneficial; windows should face the steadiest light; materials of construction should always be such as will resist wear and tear where they are within reach; all aids to cleanliness should be adopted, and any building over two stories in height, and even those if possible, should be of fireproof construction. Where schools are residential, the collective principle of living with adequate means of supervision are generally adopted.

#### LIBRARIES AND MUSEUMS.

Libraries, which are essentially buildings for educational purposes, should have a sufficiency of space for stacking books and economy of service in handling them, also good light and air to reading rooms and privacy where required. All libraries of any importance containing books and manuscripts which are hard to replace if lost, should be of fireproof construction.

Museums, picture galleries, and similar buildings which are mostly educational in nature, should have proper light for the exhibition of their contents, good ventilation, ample provision for the circulation of visitors and, when necessary, rooms for study, lectures, etc.

Such buildings, owing to the nature of their contents and the crowds which they at times contain, should be of fireproof construction, of lasting materials, and they should be provided with all aids to economy of service and cleanliness. Sufficient entrances properly located and readily accessible, should be supplied in case of necessity.

The practice which generally prevails of reaching such buildings by means of long flights of outside steps, these being generally provided for esthetic reasons, is not without its drawbacks. Why should all visitors be put to the unnecessary trouble of climbing numerous steps at the exterior in all kinds of weather when entrances could just as well be made at an easier level?

## PUBLIC BUILDINGS.

In these it will be sufficient to say that utilitarian requirements are just as important as in other buildings, though in some cases they may to some extent be modified by considerations of character and environment.

The proposed uses of the buildings should not be lost sight of and unnecessary trouble and inconvenience should not be caused to numerous persons where it can be avoided.

Narrow and obstructed entrances where they should be wide and free from obstacles to easy access; numerous unnecessary exterior steps, insufficient light and air, poor heating and ventilating, sacrifice of main accommodation to inferior uses, lack of connection of parts, narrow and indirect passages and corridors, uneconomical service, are some of the detriments which should be avoided, as can be done in every case by careful study and judicious planning. The interior arrangement should never be subordinated to exterior effect, and form should always follow function.

## CHAPTER XII.

### COMMERCIAL AND STRUCTURAL LIFE AND DEPRECIATION; MAINTENANCE, REPAIRS AND OPERATION.

Commercial vs. structural life—Different utilizations of buildings during their commercial life—Structural life and depreciation of buildings—Table of approximate structural and commercial life of different classes of buildings—Table of the approximate commercial depreciation of a building costing \$10,000—Depreciation of mechanical appliances—Maintenance and repairs—Physical existence of mechanical apparatus—Operation.

**T**HE commercial life of a building is the term of years during which it is commercially useful and will yield an adequate return in rent or convenience on its cost as a structure and on the value of the land it is built on. When this condition ceases and it is found necessary to reconstruct or to remove it to make way for a building more suitable to the section, it may be said to have reached the term of its commercial life, whatever its physical condition at that time.

As has already been pointed out in Chapter VII., the commercial life of any building is generally shorter than its structural life, or the term of years during which it can be kept in repair and utilized.

Buildings in villages and small country towns, as well as those in isolated locations, are sometimes kept in use almost to the limit of their natural life. In Europe many buildings are still occupied which have been in continuous use for several centuries.

The constant changes which are taking place in growing cities, the shifting and change of character of sections, improved methods of transportation, and altered modes of living, are the main causes limiting the useful life of most buildings. The more rapid the growth of the city the shorter the commercial life of its buildings, especially of those in the sections which experience the greatest changes.

The slower growing cities of Europe have been practically rebuilt every two or three hundred years; others are of more rapid growth, like Berlin, which has been almost entirely reconstructed in the last twenty-five years. New York and Chicago in this country, are even now undergoing a period of reconstruction of the older sections in addition to the rapid expansion which is taking place in outlying territories.

Modern methods of construction, permitting a far larger amount of accommodation to be furnished on a given area, when called for in central locations by pressure of population, have accelerated the reconstruction of built-up sections, and shortened the commercial life of numerous buildings still structurally sound.

The commercial life of buildings in New York, based on its past growth, has not, on an average, exceeded fifty years for any class of building.

It is necessary to take into account this limited commercial life of most structures, especially when erecting buildings in sections the character of which is not established, or which seem destined to become, before long, devoted to other uses. The stability of a section depends on its suitability to its uses and to some extent on the character of the buildings of which it is composed; the more costly these buildings and the larger the section, the greater the resistance to external influence.

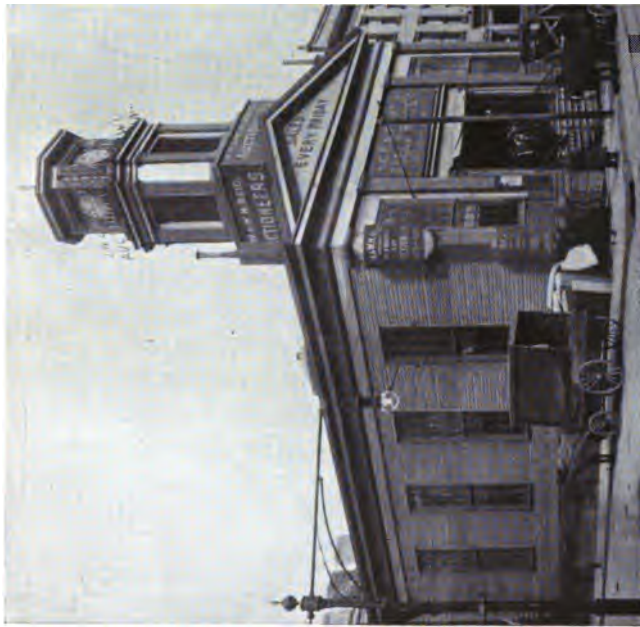


DIFFERENT UTILIZATION OF BUILDINGS DURING THEIR  
COMMERCIAL LIFE.

Buildings in growing cities sometimes undergo changes of utilization during the term of their commercial life. When the occupants of a high-class residential section are driven away by the encroachment of nuisances or by the competition of other utilities, their homes are frequently converted first, into boarding or lodging houses, later into tenements, when they may give increased returns (though their character is cheapened) by affording shelter to many more times the number of persons they were originally intended to accommodate; or again they may be utilized as workshops or devoted to miscellaneous uses.

When former residential streets become devoted to business purposes, as for instance shops, it will frequently be inadvisable at first, especially when the buildings are substantially constructed, to remove them entirely; they may therefore be remodeled, store fronts provided, and the upper stories used either for business or for cheap residential flats. When the character of the section becomes sufficiently established and the competition of new buildings requires it, they can be removed and replaced by more suitable structures.

The high stoop house in most cases lends itself but poorly to such reconstruction. It provides, it is true, a two-storied front for display, but neither floor is entirely desirable for high class shops. The basement, a couple or more steps below the sidewalk, has low ceilings and is inconvenient of access, any one wishing to inspect the display of goods in these reconstructed buildings being obliged to go up and down steps every time they approach the show window. The story above, originally the main floor of the building, and generally of good height, is quite as inconvenient to reach as when



CHANGES OF UTILIZATION.  
Two Brooklyn churches, the one on the left used for an auction sales room, the other by the Adams Express Company.

the building was used as a residence, though the success of the tenants depends on their attracting the greatest possible number of shoppers. These buildings are subject to the same objections as the split stories already described. It would seem as if better results would be obtained by removing the main floor to the sidewalk level and utilizing the space between the ceiling and the second floor for a mezzanine story, or entresol, as provided in so many buildings in Paris, although this entails greater expense on account of the change of floor levels required.

Churches, whose congregations have removed to other sections, are sometimes utilized for other purposes, becoming shops, stables, factories, etc. Old theatres are sometimes converted into warehouses, and banks and office buildings used for storage or other purposes.

In extreme cases it has been found expedient to remove the upper stories of an office or apartment building where they have ceased to earn sufficient to pay taxes. (See R. P. Bolton's "Building for Profit," page 73.)

These changed uses indicate that the commercial life of these structures is nearing its limit; but that either the time has not yet arrived when it will pay to remove them entirely, or that the capital is lacking to erect a building better suited to the altered conditions.

The shopping street once fairly established, though it may change in character, seldom if ever reverts to residential uses; the general tendency is for business to drive out residences and for the better residential sections if they do not become devoted to business purposes, to be more intensively used, as for apartment houses.

## STRUCTURAL LIFE AND DEPRECIATION OF BUILDING.

The structural life of many of the component parts of a building is less than that of the structure as a whole. The following table from Kidder's "Architects' and Builders' Pooketbook," gives the average life and annual depreciation of some building materials in three different classes of buildings:

Material in Building.	Frame dwelling.		Brick dwelling shingle roof.		Brick store, shingle roof.	
	Average life, years.	Per cent. of depreciation per annum.	Average life, years.	Per cent. of depreciation per annum.	Average life, years.	Per cent. of depreciation per annum.
Brick .....	75	1 1/4	66	1 1/4	14	3 1/2
Plastering .....	20	5	30	3 1/2	30	3 1/2
Painting, outside....	5	20	7	14	6	16
Painting, inside....	7	14	7	14	6	16
Shingle .....	16	6	16	6	16	6
Cornice .....	40	2 1/2	40	2 1/2	40	2 1/2
Weather boarding...	30	3 1/2	50	3	50	2
Sheathing .....	50	2	50	2	50	2
Flooring .....	20	5	20	5	13	8
Doors, complete....	30	3 1/2	30	3 1/2	30	3 1/2
Windows, complete..	30	3 1/2	30	3 1/2	30	3 1/2
Stairs and newel....	30	3 1/2	30	3 1/2	30	3 1/2
Base .....	40	2 1/2	40	2 1/2	30	3 1/2
Inside blinds.....	30	3 1/2	30	3 1/2	30	3 1/2
Building hardware..	20	5	20	5	13	8
Plazas and porches..	20	5	20	5	20	5
Outside blinds .....	16	6	16	6	16	6
Sill & 1st floor joists	25	4	40	2 1/2	20	3 1/2
Dimension lumber...	50	2	40	2 1/2	66	1 1/4

In addition to the above figures, the following are fair averages for some materials not included in the table:

	Average life.	Annual depreciation.
Cement floors and walks.....	25 to 40	4 to 2.5%
5 ply tar and gravel roofing.....	25 to 35	4 to 2.7%
Tin roofing .....	20 to 30	5 to 3.3%
Slate roofs .....	50 to 60	2 to 1.6%
Galvanized iron .....	15 to 20	6.6 to 5%

The structural life of any material is affected by the climatic conditions to which it is exposed and the amount

of care bestowed on it. Thus the exterior sheathing of a frame building will last much longer if properly painted and kept repaired; it will also, given the same amount of care and attention, have a longer life in an equable climate than in one where the changes of temperature are great and sudden.

The better class of stonework, terra cotta and the harder brickwork, will last for centuries in mild climates. Severe frosts affect some of the building stones and terra cotta, especially when the workmanship is not first-class; they are moreover injured by the chemical action of smoke and the gases held in suspension in the air of all cities of any size. The disintegrating action of frost and city air may be readily found in New York, especially on some of the brownstones, formerly so much in favor.

As the structural life of the average building is greater than its commercial life so structural depreciation is less than commercial depreciation. Thus a building which would under ordinary conditions be serviceable a hundred years and depreciate about one per cent. per annum may be commercially useful for a period of only forty years; the average allowance for depreciation should therefore be about  $2\frac{1}{2}\%$  per annum. This depreciation will be normal until the building becomes unsuited to the section, when it will rapidly increase.

An estimate of the average life and structural depreciation of different classes of buildings is given in the following table, and alongside, an approximation of the average commercial life of similar structures, though this is to some extent problematical and may be affected by a variety of causes. It is noteworthy, however, that when a section changes character, although the cheaper structures will be removed first, the tendency is for all unsuitable buildings to make way for others, regardless of their cost or character.

TABLE OF APPROXIMATE STRUCTURAL AND COMMERCIAL LIFE OF DIFFERENT CLASSES OF BUILDINGS, ALSO ANNUAL STRUCTURAL AND COMMERCIAL DEPRECIATION.

Class of Building.	Structural.		Commercial.	
	Life in years.	Per cent. of average annual depreciation.	Life in years.	Per cent. of average annual depreciation.
Cheap detached frame residences .....	30-40	2.90	25	4.
Good detached frame residences .....	40-60	2.10	35	2.90
Ordinary brick residences.	50-75	1.65	40	2.50
Good brick and stone residences .....	100-150	.83	45 or more	2.20
Frame tenements.....	25-35	3.50	27½	3.17
Brick tenements and flats.	40-50	2.25	35	2.90
Good class apartment houses .....	50-75	1.66	45	2.20
High class fireproof apartment houses .....	75-100	1.16	45 or more	2.20
Cheap brick shops and dwellings .....	40-50	2.25	40	2.50
Ordinary brick shops and dwellings .....	50-75	1.66	45	2.20
Good brick and stone stores and offices .....	75-100	1.16	45	2.20
High class offices & stores of brick, stone, terra cotta and iron or steel construction .....	150	.83	50 to unknown	2.

N. B.—In frame buildings and the cheaper brick buildings, there is apt to be a considerable excess depreciation over the average in the first year or two, owing to shrinkage and settlement; special allowances can be made for this where necessary.

The duration of a building's commercial life depends on the character of the section, the rate of growth of the city and the nature of this growth—whether the lay of the land and transportation facilities permit free expansion, or whether reconstruction of existing sections is necessary on account of obstacles to the establishment of new sections.

The class of buildings whose commercial life approximates nearest to their structural life are frame and brick tenements and brick shops and dwellings, the reason being that the sections they occupy are less liable to undergo radical changes in character.

As cities become established, certain sections tend to a greater degree of permanency; especially is this the case in financial sections; thus the "City" in London has held its position as the financial centre for several centuries and promises to continue to do so. The financial centre of New York is probably firmly established, though it will undoubtedly expand; it is therefore highly probable that the commercial life of the most costly buildings in this section will exceed that which has hitherto been usual, and it is unnecessary to make excessive allowances to offset a rapid commercial depreciation, based on former experiences in this city.

The same is probably true, though to a lesser extent, with certain other sections, such as the highest class residence section facing Central Park.

As a building approaches the term of its commercial use, the rental obtained from it will be less than that which could be obtained from the site were a more suitable building erected; the owners will therefore refuse to make any but absolutely necessary repairs, and the depreciation will be in an increasing ratio, showing in the above instance approximately the following results:

TABLE SHOWING APPROXIMATE COMMERCIAL DEPRECIATION OF A BUILDING COSTING \$10,000, THE STRUCTURAL LIFE OF WHICH WOULD BE ONE HUNDRED YEARS, THE COMMERCIAL LIFE BEING FORTY YEARS.

	Approximate structural value at the end of each five-year period, based on a life of 100 years.	Per cent. of annual commercial depreciation per five-year period, based on original cost.	Approximate commercial value at the end of each five-year period.
Cost value of building...	\$10,000	...	\$10,000
Approximate value at the end of five years.....	9,500	1%	9,500
do. 10 " .....	9,000	1%	9,000
do. 15 " .....	8,500	1%	8,500
do. 20 " .....	8,000	1%	8,000
do. 25 " .....	7,500	1%	7,500
do. 30 " .....	7,000	1%	7,000
do. 35 " .....	6,500	6%	4,000
do. 40 " .....	6,000	8%	0

The commercial value follows the structural value for a period of thirty years; diminishes from that time rapidly as the section changes character, and at the end of forty years, whilst the structural value of the building may be about sixty per cent. of its cost, the commercial value becomes nominal. The depreciation will depend somewhat on the rapidity of the change of character of the section.

If we adopt this course and average the commercial life midway between the periods given in the previous table, a tabulation of the yearly depreciation of the different classes of buildings will show the following results, based on the assumption that the final five to ten years of the commercial life of a building depending on its character, will be its period of greatest depreciation (see table on following page).

#### DEPRECIATION OF MECHANICAL APPLIANCES.

The amount of structural depreciation of the plumbing, heating, lighting and other component parts of what in the larger buildings is known as the mechanical plant, is subject to a great diversity of opinion amongst engineers and is complicated by the numerous inventions and improvements which tend to reduce their commercial life, even below that during which they can be of service. Added to this is the comparatively recent adoption of some of these appliances and the resulting difficulty in securing reliable data.

As, however, the structural life of the majority of these appliances is considerably less than that of the building proper and the proportion of their cost to the total expenditure is increasing, (it varies from about six per cent. in the cheaper structures to about twenty-five per cent. in some cases), it becomes important in estimating the depreciation of a building to make proper allowances for that of the mechanical appliances.



TABLE SHOWING LIFE AND DEPRECIATION OF DIFFERENT CLASSES OF BUILDINGS.

	Cheap detached frame dwellings.	Good detached frame dwellings.	Ordinary brick residences.	Good brick & stone residences.	Frame tenements.	Brick tenements and flats.
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Average life in years..	25	35	40	45	27½	35
Depreciation per annum for first 20 years.....	2.90	2.10	1.65	.83	3.5	2.25
Next 2½ years to 22½....	5.80	2.10	1.65	.83	3.5	2.25
do. to 25.....	11.	2.10	1.65	.83	3.5	2.25
do. to 27½....	....	2.10	1.65	.83	to 5%	2.25
do. to 30.....	....	4.20	3.30	.83	....	2.25
do. to 32½....	....	to	....	.83	....	4.5
do. to 35.....	....	10%	....	.83	....	to 8.5
Next 5 years to 40.....	....	....	7%	1.66	....	....
do. to 45.....	....	....	....	to 12.50	....	....
do. to 50.....	....	....	....	....	....	....

	Good class apartment houses.	High class fireproof apartment houses.	Cheap brick shops and dwellings.	Ordinary brick shops & dwellings.	Good brick & stone stores and offices.	Stores & office buildings of superior construction.
	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12
Average life in years..	45	45	40	45	45	50 or more
Depreciation per annum for first 20 years.....	1.66	1.16	2.25	1.66	1.16	.83
Next 2½ years to 22½....	1.66	1.16	2.25	1.66	1.16	.83
do. to 25.....	1.66	1.16	2.25	1.66	1.16	.83
do. to 27½....	1.66	1.16	2.25	1.66	1.16	.83
do. to 30.....	1.66	1.16	2.25	1.66	1.16	.83
do. to 32½....	1.66	1.16	4.45	1.66	1.16	.83
do. to 35.....	1.66	1.16	to	1.66	1.16	.83
Next 5 years to 40.....	3.32	2.32	8.15	3.32	2.32	.83
do. to 45.....	to 5.96	to 9.56	....	to 4.96	to 9.56	.83
do. to 50.....	....	....	....	....	....	1.66 to ?

N. B.—Nos. 1, 5, 6 and 9 are supposed to run from normal depreciation to end of commercial life in five years. No. 2 is supposed to run from normal depreciation to end of commercial life in seven and one-half years. Nos. 3, 4, 7, 8, 10 and 11 are supposed to run from normal depreciation to end of commercial life in ten years.

In his book "Building for Profit" Mr. R. P. Bolton gives the following table of life of different portions of the mechanical equipment of a modern building, making the distinction between what he designates as the fixed

equipment which he puts at 60 per cent. of the whole, and the motive appliances, estimated at 40 per cent., the motive appliances having an average life of about 40 per cent. of that of the fixed equipment. In this table has been incorporated Mr. Bolton's estimate of the commercial life of these same appliances:

TABLE OF PHYSICAL EXISTENCE OF MECHANICAL APPARATUS.

I. FIXED EQUIPMENT.		Life in years.	Com- mercial life.
Most durable elements—steel construction foundations, elevator guides and overhead framing.		40	30
Exterior framing, copper-cased housings, etc., heating pipe systems used part of the year, gas piping .....		33	27
Buried vents and ducts, when painted.....		32	26
Steel platestacks and smoke ducts, cold-water piping, electric conduits.....		30	24
Heating-boilers used part of the year.....		28	22
Roof-tanks, sanitary piping systems.....		27	21
Pressure steam piping and appliances.....		26	20
Interior drums and tanks, hot-water and pneumatic piping .....		25	20
Exposed and unpainted vents and ducts.....		24	19
Highest-class pressure steam boilers.....		22	17
Sanitary fixtures, refrigerating piping, kitchen fixtures and valves.....		20	16
Drip and drain piping, cheaper class of pressure steam boilers .....		18	14
Electric switches, wiring and connections.....		15	11
Exhaust heads, exposed galvanized ironwork, hot-water drums .....		12	9
II. MOTIVE APPLIANCES.			
Slowest speed apparatus, apparatus intermittently used .....		24	20
Dumbwaiters, switchboards, elevator gates, slow speed elevator engines, shafting and bearings, slow-gear apparatus, elevators intermittently used .....		22	18
Motor-driven pumps, compressors, and moderate-speed fans .....		20	17
Slow-speed reciprocating apparatus, such as pumps, elevator reversing gear, platform lifts.		17	15
Elevators in regular use, laundry, kitchen, refrigerating, electric devices and other apparatus frequently reversed .....		16	14
Moderate-speed reciprocating engines, medium-speed rotary apparatus, dynamos and motors..		15	12
Fan engines, high-speed rotary apparatus, on large variations of loads, dynamos, motors, high-pressure engines, condensers.....		12	9
High-speed, high pressure, reciprocating engines and machines on extreme variable loads.....		10	7

In order to show at a glance the comparative life, depreciation and yearly repairs of the different mechanical

appliances, the following table has been compiled, based on Mr. Bolton's figures and such other information as has been procurable:

TABLE OF COMMERCIAL LIFE, DEPRECIATION AND YEARLY REPAIRS OF MECHANICAL APPARATUS.

	Average life in years.	Per cent. of average yearly depreciation.	Per cent. of yearly repairs.
Steam boilers, tubular.....	20	5%	2%
Hot water boilers, cast iron....	30	3 1/4 %	1%
Hot air furnaces.....	10	10%	2%
Pumps .....	18	5 1/2 %	4%
Engines .....	18	5 1/2 %	2%
Gas Engines .....	16	6 1/2 %	8%
Motors .....	13	7 1/2 %	2%
Hydraulic elevator machinery...	22 1/2	4 1/2 %	2 to 3%
Electric elevator machinery....	18	5 1/2 %	3 to 5%
Dynamos .....	18	5 1/2 %	2%
Storage batteries .....	10	10%	5%
Switchboards .....	20	5%	1 1/2 %
Laundry machinery .....	15	6 1/2 %	4%
Refrigerating plants .....	15	6 1/2 %	5%
Steel chimney stacks.....	28	3 1/2 %	2%
Water pipes .....	28	3 1/2 %	1 1/2 %
Steam pipes .....	30	3 1/2 %	1 1/2 %
Gas pipes .....	28	3 1/2 %	..
Electrical wiring .....	15	6 1/2 %	..
Pipe covering .....	10	10%	3%
Arc lamps .....	5	20%	2%
Plumbing fixtures .....	18	5 1/2 %	1%
Radiators .....	45	2 2/3 %	1%

As with buildings, mechanical appliances frequently have a shorter commercial than structural life; inventions, improvements, changes of utilization, etc., necessitate the substitution of more efficient machinery and fixtures. The more urgent the services rendered and the more complicated the plant, the earlier will it become (at least in part) commercially obsolete.

It has been estimated that a combined structural and commercial depreciation of from 7 per cent. to 10 per cent. per annum will be suffered by the mechanical plant in the average office building, and the importance of this condition is apparent when we consider that an average plant costing 20 per cent. of the total expenditure on a building with a depreciation of say 8 per cent. per annum, the building proper having a yearly depreciation

of 2 per cent., will result in increasing the depreciation on the combined structure and plant to 3.2 per cent.

#### MAINTENANCE AND REPAIRS.

The old adage, "A stitch in time saves nine," applies with great force to buildings, which, if allowed to fall into disrepair, deteriorate rapidly; the only way to maintain a building in proper condition is to make good all defects as soon as they occur.

Maintenance includes repairing damages resulting from ordinary wear and tear, as well as those due to the action of time and the elements. The principal frequent repairs are as follows: Repointing mortar joints in brickwork of walls and chimneys, renewing broken or loosened coping, tile, and slate, repairing or replacing broken or injured woodwork, exterior or interior shingles, weather boarding, sash, doors, stairs, flooring, etc., cutting out and making good cracked or bulged plaster, cement or stucco work, also cement pavements, repairing and reputtying broken glass, making good defective rain water pipes, gutters and hardware, painting and varnishing interior and exterior, and decorating.

The cost of repairs in various classes of buildings varies greatly with their use and tenancy; thus a house occupied by its owner will probably be kept in better condition and at less cost than if let to a tenant who will not have the same interest in taking care of it. The cost of repairs is sometimes based on rent, sometimes on the cost of the building; as the latter is in some cases difficult to ascertain, it is probably better to estimate that according to the class of building, a certain proportion of the rent will be needed for repairs.

Mr. Clarence T. Coley in a paper read before the National Convention of building owners and managers, gives the following result in the operation of several different kinds of buildings in New York:

TABLE SHOWING PERCENTAGE OF BUILDING REPAIRS  
AND IMPROVEMENTS TO GROSS RENTS.

Large fireproof financial building.....	5.3%
Large fireproof commercial building.....	3.87
Small modern fireproof office building.....	2.4
Small modern fireproof office building.....	4.3
High grade semi-fireproof loft building.....	3.2
High grade semi-fireproof loft building.....	4.
Six-story medium non-fireproof loft building.....	1.56
Six-story medium non-fireproof loft building.....	4.13
Seven-story old style non-fireproof high class apts.....	11.8
High class apartments, 7-story, old style, non-fireproof (elevator) .....	8.05
7 to 8 stories modern semi-fireproof.....	10.10
7 to 8 story medium grade apartments (elevator).....	11.30
Good grade non-fireproof cold water flats, no elevators..	12.5
Good grade non-fireproof cold water flats, no elevators..	14.8

It may be said that the repairs necessary to keep buildings in proper condition during the first two-thirds of their life will average from 5 per cent. to 15 per cent. of their gross income, which works out to from  $\frac{1}{2}$  per cent. to 3 per cent. of their cost. The better the class of construction the smaller the repair bill. Tenements and cheap apartments, especially when built by speculative builders, frequently have large repair bills to keep them in proper condition.

TABLE OF APPROXIMATE COST OF REPAIRS FOR DIFFERENT CLASSES OF BUILDINGS.

Class of Building.	Per cent of cost of building.	Per cent. of gross rental.
Cheap detached frame residences.....	$1\frac{1}{2}$ to $2\frac{1}{4}$	10 to 15
Good detached frame residences.....	$\frac{3}{4}$ to $1\frac{1}{4}$	6 to 10
Ordinary brick residences.....	$\frac{3}{4}$ to $1\frac{1}{4}$	6 to 10
Good brick and stone residences.....	$\frac{1}{2}$ to 1	5 to 8
Frame tenements .....	$1\frac{1}{2}$ to $2\frac{1}{2}$	10 to 15
Brick tenements and flats.....	$1\frac{1}{2}$ to 2	9 to 13
Good class apartment houses.....	$1\frac{1}{2}$ to 2	8 to 12
High class fireproof apartment houses..	$1\frac{1}{2}$ to $2\frac{1}{2}$	8 to 12
Cheap brick shops and dwellings.....	$1\frac{1}{2}$ to 2	10 to 15
Ordinary brick shops and dwellings....	$1\frac{1}{2}$ to 1	8 to 12
Good brick and stone stores and offices.	$\frac{3}{4}$ to $1\frac{1}{4}$	6 to 10
High class offices and stores of brick, stone, terra cotta and iron construc- tion .....	$\frac{1}{2}$ to $\frac{3}{4}$	4 to 6

These allowances for repairs really include making good part of the structural depreciation of the building; thus, in frame buildings repainting is necessary, every

four or five years; roofs have to be reshingled, or if they are of tin, will have to be replaced at the end of a certain number of years; worn and injured woodwork must also be repaired or replaced. Repairs may be for a number of years well under the costs given, but at the end of that time a larger expenditure will bring the expenses up to the average.

#### OPERATION.

The item of repairs is but one of the expenses necessary in the operation of a building; these may include in addition some or all of the following: taxes and fire insurance, management, collection of rents, labor and supplies for heating, lighting, elevator service, cleaning, refrigeration.

Operating expenses bear a certain relation to the gross income of different classes of buildings, being generally least in those which offer the smallest service, such as small one and two story taxpayers and small shops and dwellings; highest in apartment hotels, hotels and high class office buildings.

The following table from Mr. R. M. Hurd's "Principles of City Land Values" gives an approximation of the percentage of expenses of operation to gross rents:

	Expenses.
Low retail or wholesale building.....	10 to 25%
Residences .....	20 to 30%
Non-elevator office buildings.....	25 to 35%
Tenements, non-elevator and elevator.....	25 to 45%
Elevator apartments .....	40 to 55%
Fireproof office buildings.....	40 to 55%

It may be added that the proportionate expenses of cold water flats and tenements will generally be less than for steam heated buildings for similar uses, say about an average of 35 per cent. for the first, 40 per

cent. for the last; those for elevator apartments higher still, or about 50 per cent., and apartment hotels, 60 to 65 per cent.

Economical operation of the smaller buildings consists mainly in keeping them in good repair; when heating, lighting and elevator and other services are supplied, however, efficient management is imperative in order to secure proper results. The importance of economical operation of any building, which, owing to services rendered, has a high percentage of operating cost to gross income, is made apparent in the following table from Mr. R. M. Hurd's "Principles of City Land Values," which shows the effect of the rise and fall of gross rents, when applied to buildings of varying percentages of operating expenses:

With percent- age of expenses to gross income.	If gross rents rise or fall	Then net rents rise or fall	If gross rents rise or fall	Then net rents rise or fall	If gross rents rise or fall	Then net rents rise or fall
10%	20%	22%	40%	44%	60%	66%
20%	20%	25%	40%	50%	60%	75%
30%	20%	29%	40%	56%	60%	85%
40%	20%	33%	40%	66%	60%	100%
50%	20%	40%	40%	80%	60%	120%
60%	20%	50%	40%	100%	60%	150%

## CHAPTER XIII.

### VALUATIONS.

Gross rentals—Good will—Abnormal sales and rents in active markets—Location and surroundings—Building—Expenses—Net rentals—Separate capitalization of land and building—Example of valuation, Nos. 1, 2 and 3—Valuations for investment—Valuations for mortgages—Valuations for condemnation proceedings—Some points to be remembered in valuing property—Analysis of property for valuations—Structural cost of buildings per cubic foot, square foot of ground area covered and square foot of floor area—Tables of costs.

**A**S MOST property in this country is owned in fee simple, or absolutely, freehold valuations only will be considered. The value of buildings on leasehold property is ascertained in the same manner as with freehold estates, subject to the conditions of the lease under which the land is held.

In "Rating," by Faraday, it is stated that although the rent of a property is prima facie evidence of its value, yet it cannot be held as conclusive.

The rent which may be derived from property is, however, the most important factor in establishing its value, subject to certain modifications, to which attention has been called.

In Chapter V. it has been stated that the value of a building is its market value, or what the average purchaser will be willing to pay for it in normal times and under normal conditions; the value of land may be simi-



larly described, and both are derived from the capitalization of the actual or potential net rent which the property may earn.

Vacant land which has no earning power, and property inadequately improved, of which the rents do not indicate the value, have a potential value which represents future earning capacity, less carrying charges to the time when it will come into full use.

In ascertaining the value of improved real estate, the land and building should be estimated separately, even though the combined value of the two may be required. Fewer errors are likely to occur by following this course, which also facilitates the checking of any discrepancy which may arise owing to misleading rents or other causes. Moreover, sometimes the value of the land or of the building only may be desired, as frequently occurs in the case of leaseholds or for condemnation proceedings.

#### GROSS RENTALS.

The first consideration will be the gross rents. These should be ascertained, or estimated by comparison with rents obtained for similar accommodation in the neighborhood if, owing to the building or portions of it being vacant, or occupied by the owner, or for any reason they cannot be obtained.

Rents are normal if they represent a fair return on the investment and do not vary too greatly from the rents of similar accommodations in competing sections of similar character. In the smaller properties it is customary to average the rental per room; in large office buildings and lofts, and in some cases in apartment houses, the square foot of rentable area is a better basis for comparison. The available net accommodation, after deducting light wells, public corridors, public toilets, elevators and stairways, will be about eighty to ninety



(1) RENTAL VALUE AFFECTED BY GOOD WILL.—Ground floor occupied as a saloon at a rental of \$125 a month, raised by owner to \$140. Tenant, who owned license, vacated premises, asking \$2,500 for license; owner offered \$1,000, which tenant refused and canceled the license, which, on account of school having been erected on opposite corner since its issuance is difficult to be replaced; rental for other purposes about \$60 a month, showing a diminished revenue from building of \$780 per annum. Brooklyn, N. Y.

(2) ADVERTISING VALUE OF BUILDING FRONTS.—Where buildings become unsuited to their location it is sometimes more profitable to cover the entire fronts with advertisements than to rent the floors above the ground floor. Broadway and 35th St., New York, N. Y.

per cent. in loft buildings, fifty to sixty-five per cent. in office buildings and forty-five to fifty-five per cent. in apartment houses, based on the area of the plot.

The rents having been verified, it should be ascertained whether they are likely to be permanent. The rentals for several previous years should be ascertained and, if possible, the proportion of vacancies during that time. By comparing with rents of similar properties, proper allowances can be made if they are too low, owing to inefficient management, long leases, which have not allowed for increased values, or other causes; also they may be too high, owing to the temporary insufficiency of accommodation, special tenants, etc. Sometimes rents are temporarily higher than normal owing to good light or a pleasant outlook obtained over an adjoining low-built property, or over attractive ground, such as may happen when an apartment house is constructed amongst detached dwellings. The erection of a high building on the adjoining plot may cut off light and view and reduce rents, and this must be allowed for, as also any temporarily beneficial condition, which may be removed.

#### GOOD WILL.

Sometimes a seemingly high rent may be explained by the fact that a tenant who has an established business will frequently, rather than move, pay more rent for his premises than he would have to do for equally good accommodation elsewhere; part of his rent in this case is paid for the good will of the business which he has built up; if the premises were vacated the owner would probably have to accept a lower rental.

Tenants with an established business may similarly purchase the premises they occupy for a larger sum than the average investor would pay, the excess price being payment for the good will of their own business.

In Professor Banister Fletcher's "Valuations and Compensations," which covers English practice, the value of good will is given as one to one and one-half years' purchase for small trades, and about three to four and one-half years' purchase for large trades, which would be difficult to work up again; one year's purchase being the net profit of a year's business.

There is sometimes an additional rental value to be derived from advertising, especially where buildings can be viewed from an elevated position or where in central locations there is a great demand for advertising space, such as the roofs of buildings, etc.

#### ABNORMAL SALES AND RENTS IN ACTIVE MARKETS.

In times of great real estate activity and increasing values, property frequently rents and sells for more than it is normally worth, owing to the discounting of future increases in value which occurs at such times, and to the fact that the prices of real estate, as well as those of other commodities, are pushed up by speculators who are willing to pay almost any amount, regardless of true value, income or other considerations, if they think that some one else will take the property off their hands at a profit to themselves.

#### LOCATION AND SURROUNDINGS.

The surroundings of the building should be examined in order to ascertain whether they are beneficial or detrimental, and all nuisances should be carefully noted. A study of the surroundings will also permit of an opinion being formed as to the suitability of the building to its location and whether it is a proper improvement. The presence or absence of modern street improvements is important; is the section supplied with water, gas, electric light; has it proper drainage and sewers; if these improvements are installed, are they paid for? Subur-

ban properties sometimes have no improvements, and when deprived of proper sewerage, for instance, may be unhealthy and subject to periodical outbreaks of typhoid fever, which diminishes their value and reduces rentals. The quality and condition of street paving and of sidewalks should be taken into consideration; asphalted or otherwise well-paved streets furnish easier access and greater cleanliness, whilst cobbles, especially when badly worn, are noisy and objectionable; unpaved streets and poor sidewalks are dirty and unpleasant, especially in wet weather, and detract from the desirability of a section.

The means of access and of communication with other sections should be studied. Proper transportation facilities ensure permanency of tenants; poor or insufficient transportation results in a cheaper class of tenants who are constantly shifting in search of better facilities and low rentals.

Access to a section through neighborhoods of cheaper character is detrimental, especially in the smaller communities.

A section may be active, it may be fully built up, and accommodation in great demand, in which case there is a probability, unless general ownership of the buildings by their occupants or restrictions interfere, that there will be a steady increase in rents and probably a more intensive use of the land and rebuilding to take advantage of increased rents; or a section may be inactive, with vacant accommodation and consequent competition to secure tenants at reduced rentals. Very low rents may attract a cheap class of tenants and result in a permanent cheapening of the section and a general reduction in values.

Careful inspection and a knowledge of local conditions will show whether the section is of established character, whether it is changing or liable to change in the



EXAMPLE OF RENTAL VALUES OF ROOFS AND SIDES OF BUILDINGS WHEN USED FOR ADVERTISEMENTS.  
View from Elevated Railroad station, Broadway and Myrtle Ave., Brooklyn, N. Y.

near future; this also will be a guide to the permanency of rentals. A well-established built-up section will resist encroachment of detrimental buildings far more strongly than a thinly built-up, scattered settlement which may be injured by the erection of a different class of buildings or by the establishment of nuisances.

A knowledge of the restrictions covering the property to be valued, also of the surrounding properties, is important, especially in good classes of residential property; the length of time the restrictions are to remain in force will have a bearing on any probable change in character. Thus, in a detached residence section, well built up and in good demand, and generally restricted to private residences, the freedom from restrictions of a few lots of sufficient size will probably result in their being used more intensively for apartment houses; the value of these parcels will be much greater than that of the average lot, and at the expense of the restricted property.

Proper allowance must be made for differences between corner and inside lots, depending on the character of the property and the benefits to be derived by the extra light and greater accessibility furnished by the former; against which on cheaper property is offset the greater cost of assessments for street improvements. In certain sections "plottage," which means the ownership by one person of a sufficiently large plot of ground to permit of certain forms of improvement, such as large office buildings or department stores, or even of apartment houses, which would be impossible on small plots, must be considered and an allowance of from five to ten per cent. may be made in such cases, though this is sometimes a discounting of future possibilities.

The following table will give an approximation of the difference of value of corners over inside lots for different uses:

TABLE OF APPROXIMATE DIFFERENCE IN VALUE OF CORNER OVER INSIDE LOTS IN DIFFERENT CLASSES OF PROPERTY.

	Cheap. Any difference in value offset by the extra cost of street improvements.	Medium Class.	High Class.
Detached residence property.		5 to 10%	10 to 20%
Attached residence property	10%	20 to 30%	30 to 50%
Apartment houses .....	15 to 20%	25 to 50%	50 to 100%
Tenements .....	15 to 20%	25 to 30%	30 to 40%
Small shops and flats .....	20 to 25%	25 to 50%	.....
Stores and offices .....	.....	40 to 50%	50 to 150%
Financial buildings .....	.....	.....	50 to 100%
Wholesale and commission...	From 10 to 15%; high buildings, 15 to 20%		
Warehouses and factories.....	Little, if any, except in high factories, where it may be 10 to 20%.		

The greatest difference between inside and corner lots occurs in business property at the intersection of two traffic streets, or where property has its long frontage on a business street. The only satisfactory way to estimate the value of such plots is by capitalizing the net rents less the interest return on the cost of the building.

#### BUILDING.

The location having been examined, the building itself can be studied and first, its access, whether the entrance is suitable, above or below grade, free from interferences and in a proper position.

An examination will show whether the building is properly planned and well suited to its uses; the size of rooms and their disposition, the arrangement of halls and corridors, and whether space is wasted, whether proper provision of light and air has been made, and if this is likely to be cut off by the erection of adjoining buildings; also what conveniences are provided which may affect rents.

The construction and condition of the building can be inspected, also condition and efficiency of sanitary appliances; if the building or any part of it needs repairs, proper allowances should be made to remedy these defects.



If the building has party walls, agreements covering them may interfere with intended improvements; this should be taken into consideration.

In some cases alterations which can be advantageously made should be noted, and the probable increased rents which can thus be obtained should be estimated.

#### EXPENSES.

The preceding examination should give a fair idea of the permanent gross rental to be obtained from the property; the question of expenses is next in order. These have been pointed out and their relation to gross rental shown in the previous chapter under the head of repairs and operation; also their varying proportions in buildings of different character. In addition it may be necessary to ascertain whether there are any outstanding assessments for street improvements or for special taxes, and in some cases allowance should be made to cover the depreciation of the building and a sinking fund established to replace the building at the end of its commercial life. Where new buildings are under consideration or additional buildings may be needed, the character of the soil is important; rock is costly to excavate and assessments for street improvements in these cases will be high; a sandy or loamy subsoil is cheaper, but marshy or made land or quicksand may necessitate expensive foundations.

#### NET RENTALS.

Deducting expenses from gross rentals leaves the net rent, which, capitalized at the proper rate of interest, subject to all the conditions previously pointed out, should give the value of the property. The rate of capitalization to be used varies with the different classes of property and with the prevailing rate of interest demanded. The more desirable the class, the greater

the ease of collection of rents and the certainty of their being permanent, the lower the rate of capitalization.

In New York City the following will be about the rate of capitalization of different classes of properties:

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TABLE OF APPROXIMATE NET RETURNS ON DIFFERENT CLASSES OF PROPERTY.

High class residences .....	3	to	3½ %
High class business property on long leases .....	2½	to	4½ %
Fair class residences .....	4½	to	5½ %
Good average business and shopping .....	4½	to	5½ %
High class apartments .....	5	to	6 %
Cheap apartments and flats .....	6	to	7 %
Small shops .....	6	to	7 %
Tenements .....	6	to	9 %
Cheapest class of buildings .....	9	to	12 % or more

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It has already been stated that the rent which a property may earn is not the only evidence of its value; highest class residences are mostly occupied by their owners, and even in the largest cities have a limited market. Many of the most costly office buildings are notoriously poor income producers, and in such cases elements other than the net rental have to be considered in establishing values.

Property may depreciate in value whilst maintaining the same or even larger rents; this occurs when the character of occupancy becomes cheaper or more hazardous, entailing a higher rate of capitalization and a consequently smaller capital value, or when there is a marked change in the prevailing rates of interest extending over a sufficiently long period.

Buildings for special uses, when rented, frequently return a large income, due to the objection of investors to putting money into property the demand for which is limited; a higher capitalization rate must therefore be adopted in such properties.

#### SEPARATE CAPITALIZATION OF LAND AND BUILDING.

In ascertaining the separate values of land and building, the income may be divided into two separate parts;

the return from the land and that from the building. The income from the land (which tends to increase in value) being at a lower rate than that from the building (which depreciates); this method is especially useful when dealing with property where the value of the building is largely in excess of that of the land.

In following out this method the total capital value having been obtained from the rental, the cost of the building, less depreciation and any necessary allowances for unsuitability and condition, should be estimated and deducted from the total value, the remainder being the value of the land.

#### EXAMPLE OF VALUATION. NO. 1.

Nineteen story, steel construction, office building, with caisson foundations in a first-class location in financial district, rents of ground floor about \$8 per square foot, of upper floors average \$2.75 per foot.

Gross rents .....	\$185,000
Expenses:	
Wages and management .....	\$18,000
Elevators .....	14,000
Light .....	7,000
Heat .....	6,000
Water .....	1,500
Supplies .....	2,500
Insurance .....	1,000
Repairs and renewals .....	10,000
Miscellaneous .....	5,000
Taxes .....	22,000
Sinking fund for depreciation of building ..	4,000
Do. for depreciation of mechanical plant..	4,000
	<u>95,000</u>
Net Rents .....	\$90,000
Capitalized at 4½ % gives valuation of.....	\$2,000,000
The building at 50c. per cubic foot cost to build.....	\$750,000
Land, 5,000 sq. ft. at \$250 per sq. ft., cost.....	1,250,000
Total .....	\$2,000,000
To obtain value of land from rents:	
Cost of building, \$750,000 at 5½ % .....	\$41,250
Deducted from net rent of \$90,000 leaves.....	48,750
Which capitalized at 4 % gives value of the land \$1,218,750 or within about \$30,000 of the amount paid for it.	

## EXAMPLE OF VALUATION NO. 2.

Four story brick apartment, 37' 6" x 88', on lot 100 feet deep; fair location, with rents averaging about \$6.50 per room, with a tendency to increase:

Gross rents .....	\$3,500
Taxes .....	\$500
Insurance .....	56
Janitor service .....	144
Coal (steam heat and hot water) .....	400
Water .....	60
Gas .....	15
Electric light .....	50
Repairs, about 9% of gross rents .....	300
Collection of rents and management (5%) .....	175
	<hr/> 1,700
Net Rent .....	<hr/> \$1,800
Capitalized at six per cent. gives total value .....	<hr/> \$30,000

To divide land and building values: The building would cost to build about \$25,000; with depreciation it is now worth about \$22,500, which at 6½% interest (including depreciation) gives \$1,462.50, leaving \$337.50 of net income, which, capitalized at 4½%, gives a land value of \$7,500.

With a sixty per cent. mortgage at five per cent. interest, leaving the investor an equity of \$12,000 over the mortgage of \$18,000, his investment will then net him \$900, which is 7½% (provided the building is kept fully rented). If a sinking fund of one per cent. of the value of the building, which is estimated to have a commercial life of 35 years more, is established, the investor will then net about 5.62%, no allowance having been made for the appreciation of the land value.

## EXAMPLE OF VALUATION NO. 3.

A three-story brick residence, medium class, rented at, or of a rental value of \$1,200 per annum, in a fair renting neighborhood.

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Gross rental .....	\$1,200
Expenses: Taxes .....	\$180
Insurance .....	25
Repairs .....	120
Miscellaneous .....	50
	<hr/>
	375
Net Rent .....	\$825

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At 5½% capitalization, value is \$15,000.

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To separate land from building value: the building would cost about \$10,000 to erect—at six per cent. gives \$600, which, deducted from net rental of \$825, leaves \$225, which, capitalized at 4½%, gives land value of \$5,000.

#### VALUATIONS FOR INVESTMENT.

In valuing property for investment, the possibility of future increases in rentals, and consequently in value, should not be lost sight of. Some purchasers prefer a fixed income, in which case properties held under long leases by responsible tenants are most desirable. The net return from these is not likely to be over from four to five per cent. Long leases, which insure a fixed income for a term of years, should always provide for payment of taxes, and in some cases, assessments, by the lessee, as these are liable to be increased, and no increased rents can be obtained until the leases fall due. Some leases, where the demand for property has increased, have a considerable value in excess of rent actually paid; this is especially the case where they run for a period of years, as, for instance, the ninety-nine year leases sometimes given in old settled communities.

Other purchasers are largely influenced by probable future increases in value; in these cases income is sometimes of secondary importance, and the probability of an increased demand or change of utilization at higher rents, and consequent rise in value, has to be taken into consideration.

In valuing for investment, when the property nets a high interest rate, the permanence of rentals should be carefully looked into, also the question as to whether the property is top-heavy; in other words, whether the depreciation of the building is likely to be greater than the natural increase in value of the land, resulting in an investment of diminishing value. In valuing buildings on leased ground, which revert to the landlord at the termination of the lease, a sinking fund should be provided to replace the cost of the building at the termination of the lease.

#### VALUATIONS FOR MORTGAGES.

In valuing properties for mortgages, permanence of rentals is more important than probable increases; no direct advantage (except an increase in security) can be derived by the lender from increased rentals and values, but a decrease in rents and values will result in his margin of security being impaired, and, in extreme cases, extinguished. If loans are made on speculative properties, any possible depreciation in values should be carefully discounted; a rapid or unwarranted increase is almost certain to be followed by a corresponding reduction.

Loans on hotels, theatres, clubs, etc., are partly loans on management. Such buildings owe their success mainly to the manner in which they are conducted; moreover, the market for them is limited, and allowances for these conditions should be made when valuing them.

Vacant properties, having no income to meet taxes and interest charges, are poor security for mortgage loans which, if made at all, should be for a much smaller proportion of the value than in the case of income producing property; moreover, the value of vacant land, for which a demand has not yet arisen, is highly speculative, and its future use is frequently difficult to predict.

The classes of property most suitable for loans are those which have a permanent rental value and a ready market; these are residence or business buildings of average size in the community in which they are situated, avoiding either extreme, the very large or the very small. Loans on buildings for special uses, or those whose success depends largely on management, should be widely margined, if made at all.

#### VALUATIONS FOR CONDEMNATION PROCEEDINGS.

In valuing property which is taken for public uses, allowance should be made to owners or tenants for the compulsory nature of the sale.

In English practice it is customary to allow owners ten per cent. over the ascertained value of the property, but no further allowance should be made for future possible increases in value.

In condemnation proceedings it is frequently necessary to make allowance for good will, which is valued according to the nature of the business and the length of time it takes to work up, depending also on the length of lease if the premises are occupied by a tenant (see under head of good will, page 254).

Where only a portion of the premises are to be taken, allowance may be necessary for "severance," where the portion of the building not taken is depreciated in value by the condemnation of the remainder. Some buildings may be rendered entirely useless by severance; others only partly damaged by being rendered less accessible, or by injury to light and air, or to the structure itself.

#### SOME POINTS TO BE REMEMBERED IN VALUING PROPERTY.

Ground floor area cannot be increased; upper floor accommodation can be increased by building additional stories; therefore, good store or office property, where

the chief value is in the ground floor, increases in value more rapidly than residence property. The disproportion between ground floor and upper floor values increases rapidly as land increases in scarcity value. Ground floor accommodation in residences is less desirable than first floor accommodation (except in cases where the ground floor has a semi-business value).

The use of elevators equalizes the value of different floors above the ground floor. For business purposes corners are of greater value than inside lots, the disproportion increasing greatly with the intensity of the demand for the property. For residence purposes corner lots are more desirable than interior lots, but where the buildings are detached and the lots of large size, the difference is not great.

Platting at acute angles makes long crossings, which are detrimental to store properties.

Lack of continuity of stores is detrimental to store values; but where shops depend on local trade, traffic is weaker in long than in short blocks, the latter having more streets leading into them; this affects rents, especially toward the centres of long blocks.

Long blocks are beneficial to shops and stores whose trade is general and whose customers are drawn from outside districts, on account of the continuity of display windows. Secondary shopping streets are strong at intersection with main traffic streets, weaker within competitive distance of these streets, stronger again as they approach the center of their own sections and tend to be strongest at about the center of gravity of the district they serve. Elevated railroads are detrimental to residence property, much less so to store property, which is benefited at stations, where they gather and distribute passengers, more especially at express stations. Advantage is taken of elevated railroads to advertise goods by



## ANALYSIS OF PROPERTY FOR VALUATIONS.

NET INCOME.	EXPENSES.	OTHER FIXED CHARGES, CHARGES	GROSS RENTALS.	Rents, actual or estimated. Are rents normal? Compare with rents for similar accommodation in neighborhood, and in similar locations. Ascertain if higher rent is paid by tenant for "good will." Ascertain rentals for previous years.
				Is there much vacant accommodation in this section? Is there much demand for this class of property? Is there much building under way to supply the demand? If the section is overbuilt and rents are too low, are they likely to improve, or to remain stationary, or to decrease?
				Suitability of building to location. Surroundings, beneficial or detrimental, nuisances, street improvements, gas, electric, water, paving, drainage. Are they paid for? Access to section, transportation facilities. Section, active or inactive. Permanency of character, restrictions.
NET INCOME.	EXPENSES.	OTHER FIXED CHARGES, CHARGES	PERMANENCY OF RENTALS.	Access to building. Is entrance on level with, above or below grade? Light and air, and possibility of same being cut off. Size of rooms, waste space. Communication between the different portions of the building. Conveniences. Can alterations be advantageously made? Construction; condition of building proper and of sanitary and mechanical appliances.
				Party Walls. Taxes, insurance, heating, lighting service. Management and rent collecting.
				Liability for assessments for street improvements or special taxes. Repairs; allowance for vacancies and depreciation. "Commercial life."
NET INCOME.	EXPENSES.	OTHER FIXED CHARGES, CHARGES	PERMANENCY OF RENTALS.	Rate of capitalization of land and building, depending on the class of property and character of use. Prevailing interest rate; high, low or normal.

displaying them at second and third story windows, also buildings seen from the station platforms are generally covered with advertisements.

Surface cars are detrimental to residence streets, but beneficial to residence property within easy reach of them. They are beneficial to store streets, except to fashionable shops, on account of their interference with carriage or automobile trade.

The pocketing of stores by the erection of other buildings nearer the street can be remedied by extending the stores out to the main alignment. Pocketed residences are permanently injured. Blanketed stores, with buildings projected on one side are injured, unless they can use the projecting face for advertising. Blanketed residences are permanently injured, losing sunlight and air.

**STRUCTURAL COST OF BUILDINGS PER CUBIC FOOT, SQUARE FOOT OF GROUND AREA COVERED AND SQUARE FOOT OF FLOOR AREA.**

Except in the case of special buildings and those which are more costly than the average, there is a tendency to an equalization of rents and a consequent similarity of cost for equal accommodation in the same section; this being the case, costs of construction can best be approximated by employing similar units as a basis, whether cubic feet, square feet of ground area covered, or square feet of floor area, depending on which will be most convenient.

In this connection we may say that generally the most useful unit of cost is the cubic foot; fewer comparative figures being needed than when the unit is the ground area built on, which requires a separate cost for each story, as well as for each class. Where a great number of buildings of similar height and class are under consideration, the unit of ground floor area is a quicker

method of comparison. The unit of floor area is especially useful for comparison of buildings having similar rental values per square foot.

In estimating cost of buildings by these methods, it is most important, first, that the actual cost of standard types of buildings be well established for the locality under consideration; second, that uniform allowances be made for heights (especially in the cubic foot method) and similar deductions for light wells, courts, etc., otherwise there is no proper basis for comparison. Although, as has been contended, there may be a distinct variation between the cost of two similar buildings, yet where character of construction is governed by building laws, and when buildings compete for tenants with similar buildings, there must be, under equal conditions, a standard cost of construction, too great variations from which show that a building is either costing too much, owing to poor management or waste of materials, or that the amount to be paid for it is insufficient to secure proper construction.

As the principal cost of the average building is in the floors, roof, doors, windows, and other fitments, any slight variation in the height of stories will not materially affect the cost of construction, the extra expense being mostly for an added height of walls. The following standard heights have been adopted for use with the tables. Any decided variation from these can be allowed for by a slight increase in the cost per unit. In buildings with flat roofs the height is taken from the cellar floor to the highest part of the roof; in those having pitched roofs, especially residences, the height is either half way up the roof where the attic is unfinished or to the finished ceiling, where attic is finished; an extra allowance being made for rooms finished in attic.

On account of the variation in size of rooms, in residences, it is difficult to establish a unit cost per room,



The following tables give

TABLE OF COMPARATIVE COST OF BUILDINGS.  
Buildings are divided into three classes.

DESCRIPTION OF BUILDINGS.

Detached Dwellings.

Cheap 1 and 2 story frame buildings (no cellar or plumbing).....  
Frame detached dwellings with cellar.....  
Nos. 2 and 3 have furnace, steam or hot water heat; No. 3 has  
quiet floors and hardwood finish.....  
Brick detached dwellings, heat; No. 3 high class hardwood finish  
parquet floors .....

N. B.—Additional allowances to be made for wide porches and

Residences Built in Rows or Semi-Detached.

Frame dwellings with brick basements.....  
Heat, ordinary finish .....

One and two-family houses, brick; Nos. 2 and 3 have furnace, hot  
or steam; No. 3 has better class of finish and plumbing...

Three to five storied brick and stone houses of the better class  
and good finish and good plumbing.....

High class fireproof houses, but not of the most expensive class..

TABLE OF COMPARATIVE COST OF TENEMENTS AND APARTMENTS.

Buildings  
per  
square  
foot

DESCRIPTION OF BUILDINGS.

Frame tenements, with or without stores, no heat, ordinary finish.....

Brick tenements and flats; No. 1 cold water; the higher priced in  
have steam heat also; No. 3 better finish.....

Apartments of ordinary construction and elevator; No. 3 good class  
good rental .....

Fireproof apartment houses, elevators and modern conveniences.....

Stores and loft buildings; Nos. 1 and 2 ordinary construction; No. 3  
construction, heavy floors.....

Fireproof lofts—modern .....

Brick and stone office buildings of ordinary or mill construction..

Fireproof office and financial buildings.....

\*Cellars and basements not included. The most expensive building  
Old brick tenements should be figured at the same height as

but this can be done in tenements and the cheaper apartments, where the rooms do not vary greatly in area. Special buildings are difficult of comparison by these methods, and their cost should be figured by taking off the quantities of materials used and of labor.

A building decreases in cost per cubic foot and per unit of accommodation up to a certain point, above which the cost increases. Thus a one-story building will be comparatively more costly than one of two stories, each having a cellar and a roof, which in the one case serves only one story, in the other, two stories. The point at which the cheapest cost of construction is reached depends somewhat on municipal regulations as to the thickness of walls and other structural requirements. It will probably be found in the building of ordinary construction at the fifth or sixth story, in loft buildings at the seventh or eighth story and in buildings of skeleton construction at from the twelfth to the fifteenth story.

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AVERAGE HEIGHTS USED FOR CUBING.

	Feet
1-story brick or frame buildings, without cellar 12 feet, with cellar .....	20
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APARTMENTS.—Modern brick tenements, flats and apartments of medium grade, with or without shops; 10 feet for each floor and 10 feet for cellar or basement. Better class apartments, 11 feet for each floor and 10 feet for cellar or basement.	
STORE AND LOFT BUILDINGS.—Eleven feet for each floor and 10 feet for cellar or basement.	
OFFICE BUILDINGS OF AVERAGE HEIGHT.—Eleven feet for each floor and 10 feet for cellar or basement.	
HIGH OFFICE BUILDINGS.—Twelve feet for each floor and 10 feet for basement or cellar.	

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